Machine Tool BLUE BOOK

FOUNDED

MARCH 1938

1905

The Red Blade

SIMONDS

Special Alloy Steel
HACK SAWS

Made by Simonds Saw and Steel Co. Fitchburg, Mass. Ask Your Dealer for this new Molybdenum Alloy Hack Saw Blade whose brilliant red color means brilliant metal cutting performance.

It's one of three grades of Hack Saws manufactured by

SIMONDS

"The Saw Makers"

Write us when you need Band or Circular (Solid or Inserted Tooth) Metal Cutting Saws or Metal Shear Blades.

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The Saw "With 100 Uses" ... UNIVERSAL

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MARVE

MARVE No. 5 Metal Company Sand Sand

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ARMSTRONG BLUM MEG. CO. To the Seath of CHICAGO

HANNIFIN

Equipped with Hannifin improved air cylinders having outside adjustment of the piston packing. Available in capacities from 600 lbs. to 50,000 lbs., for all kinds of pressing operations.

High efficiency operation is easily maintained throughout the entire life of the piston packing with the improved Hannifin air cylinder. Adjustment of the piston packing is quickly made from the outside, without disturbing any other parts. Cylinder bores are ground and honed. Perfect piston fit in a mirror-

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leakage.

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HANNIFIN MANUFACTURING COMPANY

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Model B-2 steel frame arbor press, ratio arm type. Built in capacities from 1,700 lbs. to 18,000 lbs. Alemite lubrication. Also available for bench mounting.

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No. 104

INTERNAL GRINDER

Mounted wheel held in chuck grinding small bore with spindle turning at 35,000 r.p.m.

THE Rivett No. 104 Grinder is designed to meet demand for a small hole grinder suitable for precision tool making and accurate manufacturing. It may be used as a single purpose machine in efficient production or readily and ripidly set up for the many varying requirements of the toolroom. Correct in proportion and design the extremely high spindle speeds necessary for small hole grinding can be

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MASTER FEEDING FINGERS



MASTER FEEDING FINGERS
WITH Replaceable PADS
WILL SAVE 30% & 80% OF
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COST —

REPLACEABLE PADS IN HARDENED STEEL, NICKEL CAST IRON AND BRONZE

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IT'S READY NOW! The new Thor LOOK AT THE DIFFERENCE! The U44 half-inch electric drill for both maintenance and production drill-



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TRY IT IN CLOSE QUARTERS. You can get in with the Thor U44 to places no other '4" drill can go.



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The Work It Does is little short of Amazing

.. this Buffalo

UNIVERSAL IRON WORKER

It punches, shears and cuts with equal ease. Handles angles, tees, rounds, squares, and flat steel. Also does plate slitting, coping, and notching.

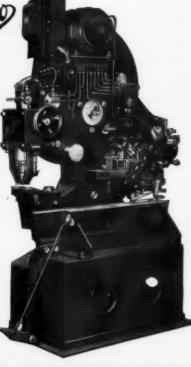
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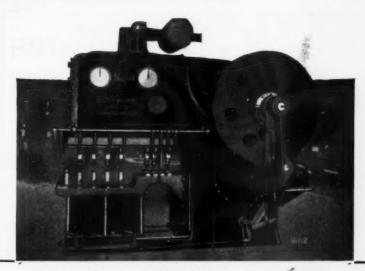
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Further, these dependable time and money-saving units—provide more die space — deeper throat — longer stroke — greater capacity — higher pressure — features that will appeal to you if you're interested in punching extra large structural shapes and big manufactured parts.

Model 13 has a punching capacity of two holes 1-1/8 inch through one-inch stock — Model 14 will punch four 1-1/16 inch through 7/8 inch and Model 15 will put four 1-1/8 inch holes through 1-1/8 inch stock.

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Contour machining saws openings in metal and shapes parts in large or small radii with special temper narrow saws. It is not to be confused with straight sawing. The DOALL is a machine tool providing precision results in sheet steel 8" thick as well as in other materials. The machine also files and polishes.

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1905



1938

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SEVERAL SIZES
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No. 455 Angle Iron Combination Capacity 2"x2"x1/4" Angle Iron or Smaller

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Two Models

The Bench Type can be quickly converted to a Floor Type mstion of a sub-base held with 4 bolts.



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A brake you can carry to the job . . weighs only 265 pounds . . takes up to 49-inch widths in 20 gauge material . . ample clearance at both ends of jaws for folded-up edges.



Quick-acting turnbuckle adjustment same as on our large brakes for different thicknesses of metal . . makes reverse bends as short as 3/16 . . graduated angle indicator on apron hinge lugs . . has every feature of a standard brake.

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Drill from .010 to 1/4 inch in all drillable materials.

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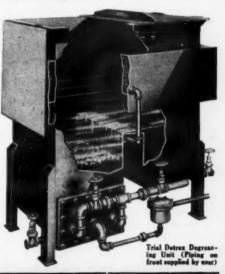
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The logical way to check up on the economies offered by the Detrex Solvent Degreasing Process is to make a thorough test—right in your own plant—with your own men —under your own actual operating conditions.

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We will be glad to let you judge the merits of the Detrex Solvent Degreasing Process—on a three weeks' free trial — without capital investment — without obligation on your part to buy.

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New Improved Universal Pneumatic Die Cushion

- Self contained portable unit, quickly installed on any punch press.
- Can be applied to advantage on dies already in use in place of springs or rubbers.
- Eliminates costly tanks and piping, and is a considerable saving on compressed air.
- Ideal for jobbing shops; used to an advantage on both short runs and long runs.
- Entire area of piston always available. Adaptable to all knock out, ejector, and die pressure pad actions.
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- Leader pin (piston stem) fully guided, die cushions rigidly mounted eliminating all piston deflection.
- Moderately priced, accurately built, simple in design and universal in application.



Use Quickmail Coupon No. 10 when you write for bulletin showing 20 ways to cut costs on your present die making.

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A Craft

It's hard to convince a craftsman that any machine can duplicate the skill and delicacy of his own trained hands. But this one, engaged in removing defects and blisters from chinaware, gladly acknowledges that with Haskins Flexible Shaft Equipment he does finer work fasser.



Your job doesn't have to be in ceramics or pottery. It doesn't have to require unusual skill. It can be practically any kind of grinding, polishing, sanding or wire-brushing. Whatever it is, it's more than likely that Haskins Flexible Shaft Equipment will also do it faster and finer. And more economically. For a booklet showing all types of equipment and a wide variety of applications, use Quickmail Coupon No. 65. R. G. Haskins Company, 4654 W. Fulton Street, Chicago.

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Because it's so portable and so adaptable Haskins Flexible Shaft Equipment has almost unlimited utility. Here it is grinding down a weld on heavy machinery.

There are more than 25 different types of Haskins Flexible Shaft Equipment. Each is built throughout for long life, low upkeep cost, speed and power that will more than meet the demands made upon it.

H-6 EQUIPMENT

½ HP motor, 360° swivel, 4 speed countershaft, 9/16"x6' flexible shaft, ball bearing spindle. HASKINS Versatile
FLEXIBLE SHAFT
EQUIPMENT



POWER and rigidity in production, accuracy and precision in tool and gauge work, and versatility in many different operations are characteristics required of the new 15-inch South Bend Series "T" lathe in hundreds of manufacturing plants, tool rooms, and machine shops. The fine workmanship, design, and new features of this lathe, combined with its smooth, quiet operation, assure quick and accurate handling of machining operations to the most exacting specifications.

SOUTH BEND LATHE WORKS 768 E. Madison St. South Bend, Ind., U. S. A. athe on a manufacturing operation

68 Sizes and Types of Lathes for every purpose.

9"lathe prices start at \$ 85 Il"lathe prices start at \$371

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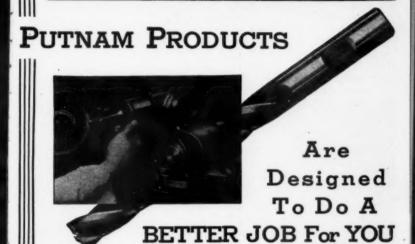


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Bulletin No. 15-C illustrates, describes and prices the different models of the 15-inch laths. Copy sent free, upon request.

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END MILLS that cut faster . . . last longer. Made of genuine high-speed steel. Heat-treated by immersion in salt baths—the most modern process in use today. Guaranteed for accurate, trouble-free service.

A NEW TYPE GRINDING FIXTURE, designed primarily for sharpening end mills, but may be used in regrinding a wide variety of cutting tools. Extremely flexible and sensitive. Makes every sharpening job easier . . . makes many of the most difficult jobs possible!

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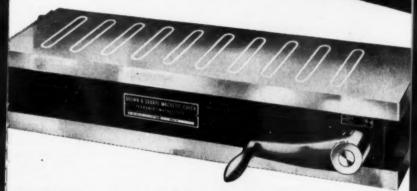
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BROWN & SHARPE MAGNETIC CHUCKS PERMANENT MAGNET TYPE—

have the advantages of electromagnetic chucks, but do not require any electric current—electrical connections, wires, switches and auxiliary generators are all eliminated. The chucks have long life and full holding power and do not heat under any conditions. Ask for Circular. Brown & Sharpe B

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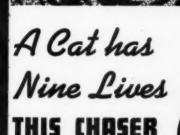
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Scully-Jones "Use-Em-Up" Sleeves
designed for driving taper shank
tools with or without tangs. Use-Em-Up
Sleeves, as now made, are accurate
and well finished.

SCULLY-JONES & COMPANY

1905 SO. ROCKWELL ST. . CHICAGO



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RESULTS

Electric Manufacturer—Cuts 1500 pieces of ½-13 copper—3" long, before sharpening.

Motorcycle Co.—Cut 200,000 pieces 1045 SAE steel with one set of chasers.

Many other examples will be furnished on request.

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We have originated a method for

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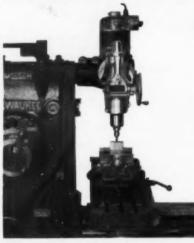
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DALRAE MIDGETM



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IT DRILLS -

IT BORES

A quill feed, high speed milling attachment for your milling machines.

Accuracy-plus minus .00025

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ALRAE TOOLS

SYRACUSE

An Opportunity for NEW BUSINESS

Two important additions have been made to the Sundstrand Machine Tool Company's open line—No. 3 Hand Millers and Sundstrand Index Bases. This now provides four popular Sundstrand open line items:

Sundstrand No. 3 Hand Millers Sundstrand Index Bases Sundstrand Balancing Tools Sundstrand Bench Centers

These products are manufactured to our well known high standards of precision and quality; have many features of design and operation which speed up production, help to create new profits for the user. Progressive dealers will find in these items an opportunity to serve their present customers more effectively and to make new friends. Progressive salesmen will certainly find many applications for these popular Sundstrand products. Be prepared, equip yourself with complete information on Sundstrand open line equipment. Write, today, for literature.

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SUNDSTRAND MACHINE TOOL CO. 2535 ELEVENTH ST., ROCKFORD, ILL., U. S. A.



No. 3 HAND MILLER



INDEX BASE



BALANCING TOOL



BENCH CENTER

RIGIDMILS - STUB LATHES

3-Wheel Tool Grinders - Centering Machines Balancing Tools - Bench Centers - Special Machines



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Steptoe Shapers



STEPTOE SHAPERS-Heavy construction, pressure lubrication and Timken bearings throughout assure rigidity, accuracy, dependability and long life. Centralized controls-instantaneous feed

and speed changes may be made with while machine is running.

Garvin No. 2X fingertip control Automatic Tapper

GARVIN No. 2-X AUTOMATIC TAP-PING MACHINES -with V-belt motor drive through four

change speed box—operator merely locates work and pulls down lever until tap engages it-thereafter operation is entirely automatic. Manufac-

Western 12-Speed Radial Drill



tured since 1865, the "GARVIN" name has always been synonymous with production tapping.

WESTERN 12-SPEED RADIAL DRILL - with 12



geared spindle speeds of from 40 to 2000 r.p.m., this ruggedly-built, easily-controlled drill is equally adaptable for small drilling and tapping jobs as well as heavy duty milling and spot facing operations. Simple, centralized controls, ball bearings throughout, instantaneous speed and feed changes and easy swinging arm assure speed and accuracy.

The Big 4 Western Line embraces Western Radial Drills, Garvin Automatic Tappers, Steptoe Shapers and Chard Lathes. It will pay you well to become better acquainted with these modern production aids.

WESTERN MACHINE TOOL WORKS

HOLLAND, MICHIGAN, U.S.A.

MODERN

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DESIGN - PERFORMANCE - CONSTRUCTION

<u>Verson</u>

JUNIOR PRESS BRAKES MAKE DIFFICULT JOBS EASY

Inner flanging on radius bends is only one of the many jobs which are handled efficiently economically—and profitably by these machines.

The installation shown is in the plant of one of the leading stove manufacturers. Through its use a completely flanged top is obtained in one handling. Operating at a constant speed of 40 strokes per minute or 17 to 50 strokes when equipped with a Variable Speed Drive, they are real producers.

Built in a full range of sizes, capacities beginning at 52" of 18 gauge, they are capable of doing a very large portion of the work now being done on larger, more costly machines.



We also build thirty sizes of larger press brakes; PRESS BRAKE DIES: and are the originators of ALL-STEEL WELDED CONSTRUCTION in the manufacture of punch presses.

May we have the privilege of consulting with you on your metal forming problems?

VERSON ALLSTEEL PRESS CO.

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Chicago, Illinois

PROGUNIER TAPPERS

Give You That Extra PLUS

That Saves Dollars on Tapping Jobs

To beat those production costs, you need the finer Engineering and Design in PROCUNIER Tappers that enables every part to produce a precision harmony that accomplishes smoother and more sensitive tapping. The extra PLUS behind every PROCUNIER Tapper means better service and greater dependability. Write PROCUNIER now for information on —

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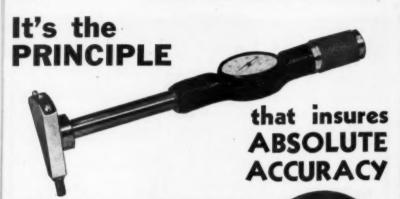
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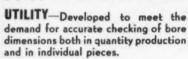




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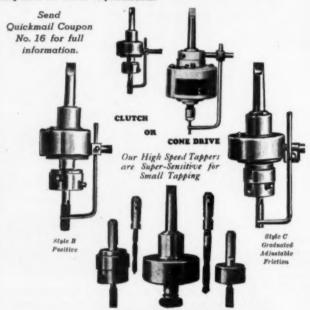
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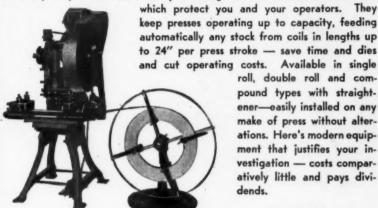
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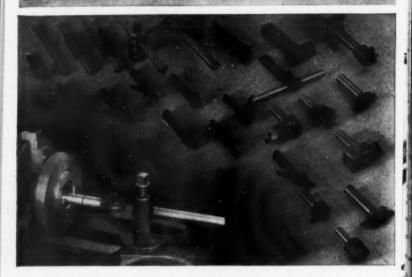
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CONTENTS

Practical	Selection	and	Use	of	Alloy	Steels	49
	(Cone	clusio	on) B	v G	. Van	Dyke	

C	c		P.Ba-	E 4
Comments	irom	tne	Editor	 34

Vew	Equipment	57

New	Trade	Literature	 110

Onickmail	Coupons	88.93

Buyers' Directory	132-145

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Are you missing the cost cutting and time saving advantages in not using Morse Tool Company's Standard Cemented Carbide Tipped Reamers? If so it will pay you to investigate the possibilities of these reamers on your job. These two manufacturers of fine quality products have found that they are saving time and money by using these tools.

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At the Machine and Tool Progress Exhibition we are showing for the first time a new type of hard metal reamer. The amazing low cost of this tool coupled with its remarkable production performance will be of unusual interest to every one in the cutting tool field. If you are not attending the show send Quickmail Coupon No. 54 for complete descriptive literature.

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BOOTH 246

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DETROIT, MICH.



Practical Selection and Use of Alloy Steels In Two Parts—Part 2

Written especially for the Blue Book

By G. Van Dyke Mgr. Special Steel Division Jos. T. Ryerson & Son, Inc., Chicago

IN the preceding article, various steels and their characteristics were enumerated.

From the information given, it will be evident that carburizing jobs can be successfully produced by the use of any one of the three carburizing steels mentioned, namely: SAE 3115, SAE 2315 and SAE 4615. The choice of any of these three steels may be governed partly by the personal preference of the operator, or the selection may be based on cost or availability in the sizes required.

In the case of the quenching steels, they naturally divide themselves into three classes. SAE 4140, SAE 3140, and SAE 2340 would naturally be used for applications requiring medium tensile and yield point requirements with maximum obtainable ductility.

SAE 6145 and SAE 3250 fall into the next class where a greater degree of hardness is required, or where very high tensile strength and yield point are necessary, and where some ductility can be sacrificed safely for the greater hardness developed by these alloys.

SAE 52100, on account of its very high hardening characteristics, is used as stated before, in the production of cams, roller bearings, ball bearings, and similar parts where hardness and resistance to abrasion are the main factors, and where ductility is not required or sought.

The detailed temperatures for quenching and drawing these various steels can be readily obtained from trade publications and we will, therefore, not attempt to list these. However, would like to offer a few remarks on the subject of heat treatment of alloy steels in general.

Carburizing or Case Hardening

The depth of carbon penetration in a carburizing operation depends on four principal factors:

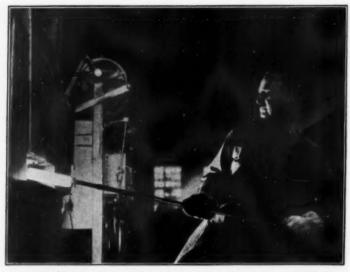
First, the type of steel used.

Second, the kind of carburizing mixture used.

Third, the size and shape of the carburized parts in comparison with the size of the carburizing box in which they are packed.

Fourth, the temperature at which the carburizing is done and length of time during which the temperature is maintained.

In the three steels which we have suggested for carburizing in this arti-



Modern heat treating practice endeavors to develop to the utmost, the desirable inherent qualities of the steels for specific uses.

cle, the carbon absorption rate will not vary much. In order to secure uniform carburization, fresh carburiz-ing compounds should be used, or some new compound should be added to the partly spent compounds in order to maintain relatively active material. Care should be used to see that parts are packed in carburizing boxes so that they more or less fill the boxes. In other words, it is not good practice to pack a small part in a large box, because it not only wastes carburizing compound, but makes it necessary for the heat to travel thru a large amount of carburizing compound before actually reaching the parts that are being carburized. Carburizing temperatures are pretty well standardized and if they are maintained from one batch to another, and the length of time is uniform, good results can be obtained and a reasonable degree of uniformity may be depended upon.

All steels will absorb carbon more rapidly at high temperatures, but the degree of temperature used is more or less limited by the ability of the steel to withstand the action of high temperature over a long period of time without detrimental effects on the core or center portion.

In order to obtain a hard case, it is necessary, of course, to quench the parts after carburizing. In the case of SAE 4615 this can be satisfactorily accomplished in some cases by quenching direct from the carburizing pot. The characteristics of this steel are such that this treatment will, as a rule, leave the core in a reasonably ductile condition, and where this method can be used, time and money may be saved.

In the case of the other two steels (3115 and 2315), it is frequently advisable to resort to what is known as a double quench treatment. This consists of first quenching the steel at the proper quenching temperature for the core material, and then reheating to a lower temperature which is satisfactory for the case, and then quenching for the purpose of producing the

hardness in the case. The various temperatures applicable to these different steels can be secured readily from the commercial handbooks published by different steel companies, and little or no difficulty should be encountered in applying the rules set down for this type of procedure.

Quenching and Drawing

In heat treating the various quenching steels listed, several general points should be borne in mind if satisfactory results are to be secured.

In the first place, it is poor practice to put very cold steel into a hot furnace, as the sudden heating tends to distort the steel. In the case of dense steels such as SAE 3250 and SAE 6145 and SAE 52100, this practice will very frequently result in cracks which will ruin the parts being treated.

It is very important in heating the steel for quenching to be sure that the desired hardening heat has penetrated uniformly throughout the entire mass. If this is not done, excessive warpage and sometimes cracking will be the result.

Considerable care should be exercised in controlling the atmosphere in the furnace, to avoid decarburization of the surface. A strictly neutral atmosphere would be ideal, but inasmuch as this cannot be obtained, it is advisable to use a very slight excess of fuel. This should preclude the possibility of free oxygen existing in the furnace, which will rapidly attack the carbon in the surface of the material and produce either soft spots or an entire soft surface.

In quenching steels from the furnace, always use a quenching medium which is the least drastic, and yet which will cool the parts with sufficient rapidity to produce the required hardness and strength. In other words, if oil quenching will give the required hard-



The quenching medium should be no more drastic then is necessary to give the required hardness and strength.

ness to a certain piece of steel, it is poor practice to quench in water. It is true that the excess hardness produced by the more rapid quenching can be eliminated by subsequent drawing operations, but the strains set up by rapid quenching are always undesirable, and there will be a much greater tendency for warpage and cracking.

After the parts have been quenched, it is recommended that they be transferred immediately to the drawing furnace or the drawing bath, which ever is used. Any quenching operation results in a rapid change in size of the part. When first placed in the quenching bath, the parts start to shrink as they decrease in temperature. When a certain point is reached in the talling temperature, the parts expand, and then at a slightly lower temperature they again start to reduce in size, and so continue until room temperature is reached. These rapid changes in shape, due to contraction and expansion, naturally set up strains and stresses in the material, and it is very advisable to relieve these strains as rapidly as possible by immediately carrying out the drawing operation, which will remove the strains caused by quenching and also bring the steel down to the hardness required.

It is very important to remember that the hardness of a piece of quenched steel depends partly on the hardening characteristics of the metal, and also on the rate at which it is cooled. It is quite obvious that a ½" round bar can be cooled more rapidly than a 4" round bar of the same steel and from the same temperature. Therefore, it follows that the same degree of

hardness will not be developed in the 4" round bar as will be developed in the ½" round bar.

This is called the—"effect of mass"—and it is essential that this be taken into consideration in estimating the results, which will be obtained by quenching parts of different sizes, made from the same steel.

The effect of mass will vary with different steels, but space does not permit giving data on this characteristic for all alloys. In order to illustrate this point, however, a chart is given showing the physicals developed by the same quench and draw on SAE 4140 from ½" round to 6" round. It will be noted that there is a drop of about 50000 lbs. on a low draw and 16000 lbs. on a high draw between ½" Rd. and 6" Rd. due to the effect of mass.

In closing it may be well to emphasize the fact that there are probably more variables in alloy treatments and applications, than in most manufacturing processes.

For this reason, it is advisable to select and depend on a good, reliable source. In this way you not only take advantage of their accumulated experience, but the alloy steel engineer will have complete information as to your equipment and requirements and can recommend accordingly.

A few companies are already making a specialty of customer information service on alloy steel, and also furnishing more uniform alloys so that it is easier for the user to obtain good results.

S.A.E. 4140-Oil Quenched-Effect of Mass in Ibs. per sq. in.

Draw °F.	1/2"	1	1"	I	2"	1	3"	1	4"	1	5"	1	6"
800	196,000	18	37,000		145,000		141,000	1	40,000		140,000		139,000
1000	156,000	14	41,000		128,000		125,000	1	20,000		112,000		110,000
1200	118,000	11	15,000		109,000		106,000	1	05,000		100,000		102,000

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Comments From The Editor

Typical of what many advertisers and readers are saying about the new BLUE BOOK is this letter from Sales Manager C. W. Beardslee of N. A. Strand & Co., Chicago:

"Please find enclosed, one-page layout for your March issue.

"In connection with your new BLUE BOOK, we certainly want to congratulate you. It is a wonderful improvement.

"We believe it is such an improvement over the older style that we have felt it profitable to eliminate some publications, believing that the increased returns which we will receive from the new BLUE BOOK will offset some of the additional advertising expense we have carried in the past.

"It is certainly a wonderful improvement and again we congratulate you."

Thanks for your kind expressions, Mr. Beardslee. It is gratifying to know that you and so many others appreciate our efforts. Your loyal support and encouragement will serve as a constant incentive to make the BLUE BOOK more helpful, more useful to advertisers and readers.

A Forecast . . .

A recent Babson report says:—"One of two things will happen—either we shall have a natural business recovery buoyed up by credit inflation, or we shall have an artificial boom touched off by monetary inflation.

A more gigantic possibility of credit growth never before existed in this country. The 12.8 billions of gold now in the United States can be expanded to a grand total available credit of

128 billions. This compares with 55 billions at the peak of 1929. Potential credit expansion is already here and it cannot be recalled."

Only the future can reveal the full significance of this situation — but it seems to portend eventual large scale expansion.

The Detroit Exhibition . . .

Manufacturers of machinery, tools, production equipment and materials are prepared for business expansion. That is revealed by the hearty response of exhibitors, eager to display their latest wares at the American Society of Tool Engineers Show, which opens at Convention Hall, Detroit, March 9th.

Visitors will have a busy time studying the array of interesting exhibits, participating in tours to important manufacturing plants, taking in the instructive afternoon movies, and attending the evening technical sessions. "Preparing Standards for Surface Quality" will be the subject of the first paper. It will be presented by Dr. E. J. Abbott and discussed from engineering and shop viewpoints.

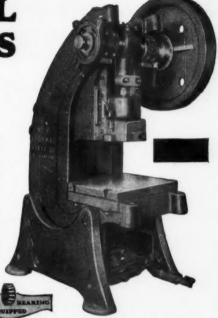
"Selecting and Buying Equipment" will be the topic of Edwin Johnson's paper at the second session. It will be discussed from the shop, purchaser's and supplier's viewpoints.

"The Tool Engineer" will be presented by Ralph Flanders, President, Jones & Lamson Machine Co., at the final session.

In every way, it promises to be a great show that will benefit the Association and its members, and industry generally. FEDERAL PRESSES

Increase Production — Reduce Upkeep —

Here are two of the many popular models of Federal Presses—sturdy, efficient units for rapid, low cost production. The Timken Roller Bearings in the flywheel are adjustable for wear, eliminating the need for expensive rebuilding and repairs after long use—preventing damage to the clutch and control mechanism. Non-repeat safety type clutch



and tripping device are standard equipment on Federal models, safeguarding against accidents to operators or dies should operator fail to release pedal.

Above is shown Federal No. 7, Flywheel Type with a rated capacity of 79 tons. At the left is shown the No. 3 V-belt drive direct drive model — also available with flat belt or direct geared drive.

Quickmail Coupon No. 68 will bring you illustrated folder showing all the different models and giving full specifications.

FEDERAL PRESS CO.

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With Interchangeable Jaws and Hardened and Ground Parallels.

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Investigate the money-saving possibilities of CDIN VISES—let us show you how to make cheaper and better jigs and fixtures at greatly reduced costs—with a great saving in time.

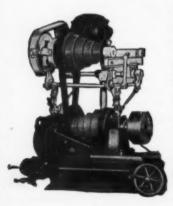
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Sales Division 110 S. Dearborn St., Telephones Franklin 3280-3281



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A Remco user writes ... "another important feature of Remco Drives is that greater production can be had due to the convenient arrangements for keeping the belt tight and the machines at their production peak" . . Install Remco Drives in your plant if you want more output, lower power costs, increased safety, reduced noise, rent-saving from a more compact shop layout.

Write for complete information.

REMCO PRODUCTS CORPORATION

110 South Bearborn St., Chicago, III. Telephones Franklin 3280-3281



by Wesley G. Paulson, Editor

Ex-Cell-O Precision Facing Machine

Suitable for the facing of pump bodies, clutch hubs, valves or miscellaneous flat surfaces—also such operations as turning rabbet diameters of motor end shields and milling of compressor cylinder face slots—in small lots or on a production basis—that's the particular field for which the new Ex-Cell-O unit is intended.

The spindle units are placed at right angles to the work table travel—otherwise, this machine is similar to the Ex-Cell-O precision boring machines, having the same precision ball bearing spindles and hydraulic system of operation and control.

Depending on the number and type of spindles used (any number from one to six can be accommodated on the bridges) driving motors can be mounted above, beside or below the spindles, thus permitting a large number of spindle combinations.

Providing a wide variation in feeds, the work table traverse is operated and controlled by a hydraulic cylinder. Adjustable dogs on the front of the table and guarded, automatically control the rapid traverse, location and length of table feed.

Parts may be rotated by the spindles or held stationary on the table. An adaptor, arbor, hand or air operated chuck may be used to clamp the part to the spindle nose. Work may be mounted on the table with a manually or hydraulically operated fixture.

Between the table and bridges is a chip chute that may be arranged to direct chips to either side of the machine.

For jobs requiring coolant, a reservoir is cast in the machine base, and the pump may be driven by the main motor. A suction system can be installed for dry operations.



The table is 15½x50 inches, with a fixture pad 15½x44 inches. Center distance between table ways is 9½ inches. Maximum table travel is 12 inches; rapid traverse 12 feet per minute; and feed may be adjusted anywhere from one to 23 inches per minute. Machine and chip tank require a floor space 56x73 inches.

Address the Ex-Cell-O Corp., 1188 Oakman Blvd., Detroit, Mich., for further information, using your letter-head—and please mention The BLUE BOOK.

Brown & Sharpe "20 Series" Plain Grinding Machines

Designed and built for precision, with the production advantages of electrical control—the new "20 Series" grinders are said to be a departure from previous design.

Compact, powerful manufacturing units, entirely self-contained, they are intended for the cylindrical grinding of medium-large parts on a production basis.

Manipulation of various selector switches and control knobs, grouped within easy reach at the front, governs all operating functions of all major units. That assures easy operation, and the electric control devices give smooth and accurate response.

Once set for a given job, the machine may be controlled entirely by the cross feed handwheel. Turning one selector switch provides this semi-automatic grinding cycle, whereby a slight rotation of the cross feed handwheel advances the wheel to the work and starts the headstock, the table (except when set for plunge-cut grinding), cross feed and coolant pump.

When the work is "to size," the

when the work is "to size," the cross feed is automatically disengaged and rotation of the handwheel to the starting position withdraws the wheel and stops the headstock, table and

coolant pump.

Manual operation is provided by two control knobs. The table knob starts and stops the table. Depressing the knob causes the table to stop at the end of its travel. The headstock knob starts and stops headstock and coolant pump, and a selector switch enables this knob to control the table movement.

When it is desired to inspect the work, depressing the headstock knob will stop the coolant without affecting headstock rotation. The same control may be used to jog or rotate the headstock slightly in loading or removing

work.

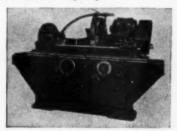
Other electrical features include table dwell (adjustable from 0 to 1½ seconds); electrical braking and reversal of the table motor; individual motor

drive for wheel spindle, headstock, table, oil and coolant pumps; and the simplification and safety of operation provided by interconnection of the control circuits.

Capacity of the No. 20 is 10x18 inches with a maximum swing of 10¾ inches over the table. A 24 inch wheel clears work to 10 inches diameter, and a 30 inch wheel to 6 inches diameter.

No. 22 is identical except for a longer bed and table, taking work to 36 inches between centers.

The machines are furnished for either A. C. or D. C. power supply and require about 18 h.p. for operation at maximum capacity.



Headstock speeds range from 80 to 320 r.p.m. There are two ranges of table speeds of 15-60 and 75-300 inches per minute with extra slow rates of 7 and 11 inches. Headstock and table are driven by separate D. C. motors, rheostat controlled, providing practically any desired rate within the limits stated. The motor-generator set supplying D. C. current for these motors is located in the rear of the hed

Wheel spindle is driven by multiple V-belts from a motor on the wheel slide and change sheaves give rates of 825 and 1035 r.p.m. The phosphor bronze spindle boxes are easily and uniformly adjusted while spindle is running, and the construction prevents application of excessive pressure.

Other mechanical features include adjustment of cross feed throwout (manual or automatic) to .0001 in.; scraped ways for table and cross slide; rigid one-piece bed with three-point

support; and automatic lubrication of wheel spindle, wheel slide ways, cross feed and table mechanisms and table ways by gravity flow of filtered oil, supplied by a motor driven pump.

In addition to the extra equipment usually available for a plain grinding machine, these new units may be equipped with a revolving spindle headstock; a low range of work speeds (46 to 185 r.p.m.); a wheel spindle reciprocating arrangement and wheel slide rapid travel arrangement at extra cost. The latter device provides for greater speed, convenience and safety in loading and unloading work, by providing a rapid, smooth and positive 2 inch advance and withdrawal of the grinding wheel by electric power, controlled manually or incorporated in the cross feed handwheel semi-automatic operating cycle.

Address Brown & Sharpe Mfg. Co., Providence, R. I., for copy of a new bulletin illustrating and describing fully, the many features of these new grinders—and please mention The

BLUE BOOK.

CUTS CLEAN

Whether it's a straight, circular or irregular job, the BEVERLY SHEAR gives a clean, sheared edge without knurl or distortion — and with minimum effort.

Made in two sizes, either of which may be carried in a tool box — No. I weighs 16½ lbs., and cuts up to 14 gauge.

No. 2 weighs 32 lbs. and cuts up to 10 gauge.

Reasonably priced-send for descriptive circular

THE BEVERLY

SHEAR CO. CHICAGO, ILL.

Thomas Inclinable Power Presses

A line of presses, ranging in capacity from 5 to 75 tons is presented by the Thomas Machine Mfg. Co., Etna P. O., Pittsburgh, Pa.
Attention is called to the method

Attention is called to the method of supporting the press slide, which provides three-point support and adequate lubrication for the gibs at all points. Wearing parts are adjustable, and if necessary, can be replaced without remachining the frame.



The slide moves vertically in double 45-degree gibs of hardened steel. Back gibs are bolted to the frame. Left and right front gibs are adjustable. A hardened steel key is doweled and bolted to the slide and is accurately fitted in a slot in the heavy cross member which is cast integral with the frame and extends vertically the entire length of the gibs.

Oil reservoirs are cast in the slide at each side and radial outlets are provided at points throughout the gib length. A similar oil channel is provided to lubricate the sliding key at



ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

Send TODAY for latest circulars

PRINTZ FLECTRIC CO.

14595 KENTUCKY AVE.,
DETROIT. MICHIGAN

No Lost Parts—No Needless Steps



WITH NEW TYPE SECTIONAL STOCKROOM

Vibration - proof, Stackbin sections sections sections in the sections actions that can be set up or moved quickly and easily, by any workman, without tools.

Stackbin sections eliminate needless steps because they can be carried to the production line and quickly set up near machines or on benches. The full-view hopperfronts keep contents from spilling and within easy reach. Smooth interiors speed up handling,

There's no obligation to see how Stackbin sections cut your handling costs. Write today for full details. Stackbin Corp., 55 Troy St., Providence, R.I.

STACKBINS
"STACKED AND STILL ACCESSIBLE"

the rear of the slide and convenient oilers are provided for renewing the oil supply.

A one-piece eccentric shaft of rigid design is used where length of stroke permits. For longer strokes, crankshafts are used.

Main bearings are of the 45-degree split type and bronze bushings are available at a slight extra cost.

A safety clutch is provided for single stroke non-repeat or continuous operation at will. When setting dies or making adjustments, the press can be locked out of operation. It is said the flywheel may be backed-up without damaging the clutch mechanism.

An elevating screw is provided for inclining the presses, in all sizes where the weight permits such construction. It is asserted that very little change in the die to floor height occurs when the press is inclined even to the full 30 degrees.

Plain, flywheel drive or geared drive presses can be furnished. Motor drives are available in flat or V-belt types, or with motor pinion geared direct to the flywheel.

For complete information, address the makers on your letterhead, and please mention The BLUE BOOK.

Hisey-Wolf Heavy Duty Drill Grinders

The Hisey-Wolf Machine Co., Cincinnati, O., offer four new drill grinder



models, of one and two h.p. capacity,

Tool and Die Makers Attention

ACTUAL FIGURES SHOW THAT SAVINGS AS LARGE AS 50% to 60% and
more in many cases are easily
obtainable—in the cost of making
EXPENSIVE DIES, GAGES, TEMPLATES, STRIPPER PLATES,
CAMS, METAL PATTERNS,
EXPERIMENTAL WORK AND MANY
PRODUCTION JOBS, by the INSTALLATION OF AN Oliver of Adrian
Die Making Machine.

Their was permits less skilled energiess.

Their use permits less skilled operators . . . Assures work on time . . . Greater production per die, due to more accurate clearance.

Just the machine to relieve congestion in your tool room.

You will find them fast and accurate on all sawing and filing operations.

ORDER AN OLIVER TODAY—MACHINES AVAILABLE AS LOW AS \$125.00 and 10 sizes to choose from.

Send Quickmail Coupon No. 17 for Catalog.



OLIVER INSTRUMENT COMPANY

1408 EAST MAUMEE STREET

ADRIAN, MICHIGAN

A. C. or D. C.

Adjustment is provided for grinding cutting clearance (angle at circumference) and the point angle may be varied from 37 to 70 degrees. They will grind straight or taper shank drills with 2, 3 or 4 flutes—also flat or chucking drills or flat twisted drills with oversize shanks.

The drills are supported in V guides

no clamping or chucking is necessary. Screw feed assures equal angles

and lip length.

Drills from 1/8 to 21/2 inches can be accommodated and up to 20 inches in

length.

The 1 h.p. models are equipped with 3/4 inch wheel arbors for $10x1\frac{1}{2}$ inch cup wheels and 10x1 inch straight wheels. The 2 h.p. models have a 1 inch wheel arbor for $12x2\frac{1}{2}$ cup and $12x1\frac{1}{2}$ inch straight wheels.

Distance between wheels on the smaller model is 18½ inches, and on

the larger 20 inches.

Address the makers for full information, and please mention The BLUE BOOK.



For economy and high production in grinding, lapping, polishing and finishing small parts. Readily adapted with collets or step chucks to handle work at low unit cost. Hand or foot operated, with patented automatic brake. Two speed dust-proof motor will operate continuously without overheating.

Send today for circular 351

Schauer Machine Co. 2064 Reading Road, Cincinneti, O.



Which Method
Is Quicker?
Safer?
Better?

No great amount of study is needed to see the advantages of the MODERN COMBINATION DRILL TABLE . . . on this job . . . on many similar set-ups in your shop.

It will save its cost in labor and time every six months. There are models to fit every drill press.

FREE? We will gladly place this tool in your shop without cost to you now—or without cost to you six months after combination is installed. HOW?

Quickmail Coupon No. 57 will bring you the whole story.

We also manufacture the MODERN Cutting-Off Machine.



THIS



OR THIS



MODERN MACHINE TOOL CO.

JACKSON

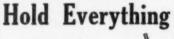
MICHIGAN



S. C. ROGERS & CO.

Niagara No. 192 Beading . Machine

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y., announces a new No. 192 geared beading machine for 18 gage stock. Designed for heavier beading operations, this modern unit is intended to solve the problems encountered in the manufacture of blow pipes, furnace casings, ventilators, heavy cans, agricultural equipment, stacks, etc.





GEM VISES

Adaptable, time-saving tools on a wide variety of Production, Tool-Room and Maintenance operations. Extra large capacity. Deep jaws. Built to stand up and give long service and complete satisfaction; they soon pay for themselves in time saved.

3 SIZES

3½-inch 6½-Inch

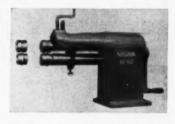
10½-Inch

Booklet describes our entire line

J. E. Martin Tool & Die Works

Established 1912

518 W. State St., Springfield, Ohio



The base is cast integral with the frame, and a heavy flange is provided on three sides. There are holes at each corner for convenient solid mounting on the work bench. The large area of the base provides a rigid support for the machine.

Interchangeable rolls are available for single beading, O. G. beading and crimping. Special beading rolls, single and multiple, can be made to order.

Specification sheet giving a complete description and working data may be obtained by addressing the makers on your business letterhead and mentioning The BLUE BOOK.

Modern Shops Prefer—The Handnib-

for Toolroom, Sheet Metal and Experimental Work—saves up to 90% on templates and trial blanks by eliminating costly hand work. Cuts sheet metal into any shape desired in one-tenth of the time usually required. Also cuts drill rod.

A HANDNIB quickly pays for itself with the savings which it makes possible. Send TODAY for descriptive folder.

NATIONAL MACHINE TOOL CO., Racine, Wis.





You pay only \$65.00 for one R and L

Turning Tool capable of producing the same kind and amount of work.

THUS YOU SAVE \$235 INITIAL COST ALONE!
In addition, you realize worth-while savings in production time and effort.

Your R and L Tool serves for:

ROUGHING

FINISHING

AS A BALANCED TURNING TOOL

COMBINATION TURNING AND BURNISHING TOOL SIMULTANEOUS DRILLING AND TURNING

EXCLUSIVE PATENTED FEATURE—Can be converted from Right to Left or Left to Right in ten seconds.

Mail Quickmail Coupon No. 64 for catalog giving complete information.

R and L Tools, 1825 Bristol St., Nicetown, Philadelphia, Pa.

Michigan Tool "860" Gear Finisher

A new gear finishing machine will make its debut at the Detroit A.S.T.E. Show, in the "gear shop in operation" exhibit of the Michigan Tool Co.

This low cost unit rounds out the line of Michigan gear production equipment. In effect, it is a "little brother" of the rack type finisher. It is designed for use where production quantity limitations or need for finishing wide varieties of gears on one machine do not justify the installation of a rack finisher. It is asserted that the 860 provides lowest initial machine and tool costs in the gear finishing field today.



The unit is of the single rotary cutter type, operating on the same basic crossed-axis principle used in this Company's rack type finishers. The cutter and gear rotate in mesh on the 860, but about different axes, so as they rotate, a diagonal sliding action is provided across the face of the gear teeth. Serrations in the cutter teeth shave off excess material.

In operation, the gear is loaded into the machine on arbors or between centers. A control button starts rotation of the cutter, driving the gear with it. As the cutter revolves, the table carrying the cutter is fed away from the operator toward the rear of the machine until the cutter has passed the point where center distances between cutter and gear reach the minimum—when the gear is properly sized.

Here, the table feed reverses automatically, carrying the cutter back through maximum depth of contact with the gear, toward the front of the machine. This completes the cycle and the machine stops automatically for reloading.

Cutter teeth are serrated so that the same cutting action takes place on both sides of the land between the serrations. This action is said to be extremely important, since it prevents undesirable burnishing or cold working of the metal on the surface of the teeth being finished. Also, it is claimed to result in a free cutting tool.

Setting up, the table is raised or lowered to the required center distance and locked there while finishing all gears of the same diameter.

A sine-bar setting in addition to a scale and verring reading to 5-minutes, are provided for the cutter spindle. This makes it a simple matter to set or reset the machine to duplicate the exact lead desired. A swivel mounting for the cutter head provides for right or left hand gears.

It is pointed out that the cutter is mounted on the table so as to eliminate spring or deflection that might be encountered with overhanging unsupported spindles and reciprocating parts which sometimes result in inaccuracies.

The short table-travel stroke makes for rigidity in the 860, which is another factor in assuring accuracy.

Other features are precision type ball and roller bearings sealed against dirt and cutting oil—fan cooled motor mounted in base for protection against dirt—spiral bevel drive gears running in grease, etc.

Coolant tanks, mounted inside the column are readily removable for clean-

Electrical controls are mounted on a removable panel inside upper rear column door.

The 860 is available in two types-8-inch and 12-inch—the designation referring to maximum gear diameters

that may be finished.

The unit is powered by a 3-h.p. 1200r.p.m. motor designed into the machine, but readily accessible. Weight is given as 4600-lbs. Overall dimensions are—32-in. width, 50-in. depth and 703/4-in. overall height. Work height is 481/2-in.

In addition to the 860, Michigan Tool expects to exhibit a new model rack type finisher in operation, as well as a gear lapper and a lead checker. Also, tungsten, titanium and tantalum carbide, Crobalt and steel cutting tools, and numerous applications of area-

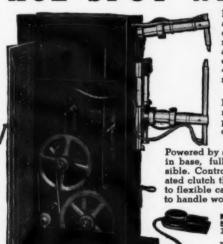
contact cone worm gearing.

Address the Michigan Tool Co.,
7171 East McNichols Road, Detroit, for further information pertaining to the 860 or other products, and please mention The BLUE BOOK.

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MOTOR DRIVEN, AUTOMATIC

ACE SPO WELDE



For high speed, dependable spot welding with precision of pressure and accuracy of timing heretofore available only in high priced equipment. Speeds from 40 to 120 spot welds per minute.

Mechanical operation eliminates fatigue, speeds up production and cuts labor costs.

Powered by self contained unit mounted in base, fully enclosed, easily accessible. Controlled by magnetically operated clutch through foot switch attached to flexible cable. Operator's hands free to handle work.

Made in 4 Sizes from 15 to 50 KW. Write for Bulletin MD-

For information on foot operated ACE Spot Welders ask for Bulletin 62.

Send Quickmail Coupon No. 28 for full details and prices.

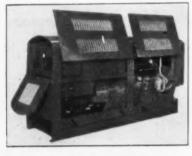
PIER EQUIPMENT MFG.

WELDING EQUIPMENT DIVISION

632 Cross Street. Benton Harbor, Michigan

Lincoln Electric Diesel Arc Welder

A new Diesel unit, said to differ radically from popular conceptions in that it compares favorably with gasoline engines in simplicity, weight, cost and operating speed, has been adopted for driving arc welding generators by The Lincoln Electric Co., Cleveland, Ohio.



Built to Lincoln specifications, the Diesel engine is said to have been thoroughly tested in the field in severe service.

It is asserted that the new unit cuts fuel costs from 33 to 86%, depending on cost of the fuel oil used.

The engine is said to embody a new Diesel principle in patented combustion chambers. Accelerating turbulence of the fuel and air mixture, the new design is said to make for more complete combustion, higher efficiency and reduced smoke and noise. Position of the combustion chamber is stated to provide more uniform distribution of pressure on the pistons.

Other engine features include pintle type fuel nozzles, said to be non-clogging and non-enlarging; three fuel oil filters, one oil type air filter and one lubricating oil filter; and use of the requisite number of standard 6-volt automobile batteries for starting. Through a standard relay the exciter charges the batteries. The main weld-

ing generator is used to start the engine.

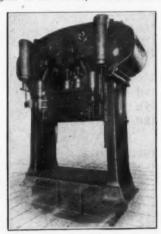
The generator is a 300-ampere shield arc SAE unit with dual-continuous control—a method of control said to provide the right size and type of arc for every application. Generator features include continuous voltage control; continuous current control; extra wide range; independent excitation; all-purpose meter and the other features which experience has shown necessary.

Price of the unit is said to compare favorably with that of gasoline engine driven sets.

Address the Lincoln Co., for further information, and please mention The BLUE BOOK.

Bliss No. 4-CT-12-180 Four Point Toggle Press

Some idea of the massiveness of the new press may be gained from the fact that the distance between uprights is 180-inches, and area of the



8-inch thick bolster plate is 100-inches front to back by 180-inches right to left. The two crankshafts running

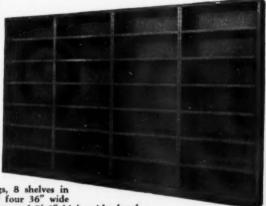
Complete

OOL ROOM EQUIPMEN

Bins, Shelf Boxes, Inserts for the Storage of Drills, Taps, Reamers, Chucks, Cutters and Small Parts.

STEEL SHELVING

- Simple to erect.
- · Easy to adjust.
- · Shelves adjustable on 2" centers.
- · Capacity each shelf, 400 lbs.
- · Low cost-small depreciation.



As illustrated, 7 openings, 8 shelves in height. Rack consists of four 36" wide units. Overall 12' 0" long and 7' 3" high, with closed backs, ends, center partitions and bases.

Rack No.	Depth	Price*		Extra Shelves				
412	1 Foot	\$44.92	36"	x	12"	each	\$0.71	
418	11/2 Feet	56.31	36"	x	18"	each	\$1.00	
424	2 Feet	67.25	36"	x	24"	each	\$1.27	
	*Prices F.O.B.	Cleveland, Ohio. Shipped	knocke	d	down.			

INTERIOR STEEL SHELVING available in many other styles and sizes. Send us your floor plan with particulars for prices.

Send Quickmail Coupon No. 71 for additional information.

THE INTERIOR STEEL EQUIPMENT CO.

2352 E. 69th STREET, CLEVELAND, OHIO

FILES • DESKS • CABINETS • SHELVING • LOCKERS

front to back have a diameter of 12inches at the bearings and 16-inches

at the crankpins.

While designed for drawing large body panels and one-piece tops for autos and similar stampings, the press may be converted easily for single action operation for blanking work. The six hydro-pneumatic cushions in the bed, having a capacity of 200 tons, when used in conjunction with the press operating for double action really give triple action results.

The cushions are fitted with locking devices which lock the pressure pads down until the plunger has returned far enough to avoid distortion. The action may be timed to release the cushions at any portion of the upstroke of the plunger, and the cushions may be released separately in any

order desired.

The frame is of tierod construction with the uprights, bed and crown cast from high test alloy pearlitic iron. Gearing is of steel and the reduction is such as to drive the press at either

3½ or 5-strokes per minute, by means of a 2-speed 25-h.p. motor.

Clutch is of the multiple disc, pneumatic friction type, controlled by electric palm buttons. It is said that the press may be inched for die setting as easily as the smallest. A central control panel provides several optional methods of operation by the turn of a switch.

Plunger dimensions: — stroke 44 inches; shutheight, plunger to bed 98 inches; adjustment 25 inches; area, front to back by right to left 79 x 161 inches. Blank holder dimensions:—stroke 36 inches; shutheight, blank-holder to bed 88 inches; adjustment 25 inches. The extremely long adjustments, which are of the rigidly supported barrel type, permit use of either high or low dies as required.

A Farval system with automatic control handles the lubrication.

Address the W. W. Bliss Co., 1420 Hastings Street, Toledo, Ohio for further information, and please mention The BLUE BOOK.



This Machine Will NOT Solve All Your Metal-Cutting Problems

It will not take the place of a regular die-cutting band saw, because you cannot make interior cuts with it—it is not designed for that kind of work.

It will not take the place of a power hacksaw—it is not designed for that kind of work either. It will not slab off heavy steel sections, nor will it break any records in cutting tool steel. It will not do a lot of jobs for which you should have a machine that would cost ten times as much...

But It WILL

Save your men hours of time in cutting templates, cutting light structural and extruded shapes, in sawing light jig and fixture parts and in sheet-metal sawing in the foundry, one superintendent reports that it has cut his gate-trimming costs 60% . . . it will trim die castings . . . It is ideal for the metal-pattern shop . . . it will do a swell job of cutting plastics

Once in your shop, you will find it indispensable for dozens of odd jobs . . . all time-consuming when done without it.

The price is astonishingly low . . . so low, in fact, that it should pay for itself before you have it a month!

Write to-day for full details and prices. Use Quickmail Coupon No. 29

DELTA
Manufacturing Co.

685 E. VIENNA AVE. MILWAUKEE, WIS.



FOR FIVE CONSECUTIVE YEARS

UNIVERSAL BUSHING SALES INCREASED 50% EVERY YEAR OVER THE PREVIOUS YEAR'S VOLUME

BECAUSE – Universal Drill Bushings

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ACCURATE

MADE TO
A. S. A.
SPECIFICATIONS

10 PER CENT LOWER IN FIRST COST





INTERCHANGEABLE WITH OPTIONAL LOCK

EXCEPTIONALLY LONG LIFE

UNINTERRUPTED SOURCE OF SUPPLY

Send Quickmail Coupon No. 50 for catalogs describing Universal Collet Chucks and Drill Bushings.

UNIVERSAL ENGINEERING CO. FRANKENMUTH, MICHIGAN

Chicago Universal Brake

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill., announce a new universal brake, built to meet the demand for a hand bending brake capable of making all types of bends required in modern sheet metal work.

The makers stress that the new brake is not just a combination machine, and it is said to retain all the



essential features of the Chicago steel hand bending brakes.

The machine can be used for making round bends up to 3½ inch radius. All bending edges are quickly removed and replaced. With the new adjustable top leaf, changeover from regular setup to box and pan brake can be made easily and quickly. Internal flanges or intermittent flanges are made with the new type sectional bending leaf. The new quadrant gauge permits quick setups for a variety of angle bends on a production basis. Inserted bottom jaw can be used in sections for work requiring flange clearance in bottom jaw. Eccentric pin provides instantaneous forward and back adjustment of top jaw.

Address the makers on your letterhead for copy of bulletin, illustrating and describing all details of the new brake.

NO LOST MOTION in NUT TURNING

WITH THE

FAVORITE

REVERSIBLE RATCHET

WRENCH

Many operations require the quick turning of nuts. This can be efficiently done with the "FAVOR-ITE."

The wrench head encompasses the nut on all sides, so there is no danger of slipping, and damage to nut or injury to operator is avoided.

Opening in head allows bolt to pass clear through.

Each wrench can turn two differentsized nuts—one on each side of head. Reverse motion instantaneous by turning pawl.

Send Quickmail Coupon No. 35 for full particulars.

GREENE, TWEED & CO.

SOLE MANUFACTURERS

109 DUANE STREET

NEW YORK, N. Y.

Detroit Show Offers Attendance Inducements

An unusual scheme in the history of show and convention management, will be tried in connection with the American Society of Tool Engineers Exhibition at Detroit, March 9-12. Proceeds from the show are being assigned to local chapters of the A.S.T.E. in advance, to aid them in bringing members from all over the country to the show. The money will be paid to those who are coming at their own expense, in the form of mileage rebates. An interesting fact is that these rebates in many cases, depending on the distance from Detroit, will apparently exceed by a considerable amount, the member's annual dues to the Society.

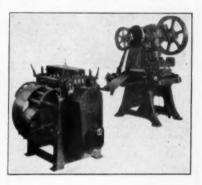
Littell Double Power-Driven Straightening Machine

Straightening stock before feeding into a punch press is the object of this special Littell unit. Some materials such as soft aluminum, brass and copper, quickly take a set when the stock is run through the straightening rolls intermittently. Continuous straightening of the stock in this machine is effected by the use of a variable speed drive.

An interesting feature is the adjustment of the upper straightening rolls which are individually adjustable, or may be adjusted as a unit. driven feeding rolls at the front and back of the straightening rolls and

power-driven lower straightening rolls insure the material being easily and quickly started through the machine.

Sufficient power is provided for handling wide and comparatively heavy stock. The coil holder attached to this machine, can be used when coils are of a relatively small diameter. which saves floor space. An apron supports the stock into the pinch rolls to prevent kinking of soft stock. The machine is automatically controlled by a mercoid switch so that if the press is stopped, the straightening machine will stop automatically.



The illustration shows the material being fed into a press fitted with an intermittent cut-off die. This die can be set to cut at every stroke or any number of strokes. With a variation in length of feed, permitting the cutting of stock at any designated num-

SUPERIOR QUALITY AND WORKMANSHIP PLUNKET VISES

The Shaper Vise has graduated base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

10° jaws, 21/4° deep, opens 81/2°. Weight 125 lbs. \$4. Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. a. b. Chicago. Write for illustrated folder today. Dealers wanted in unoccupied territory.

SQUARE BASE SHAPER VISE J. E. Plunket Machine Co. 1823 W. Late Street Ohicago, Illinois

ADJUSTABLE WHILE RUNNING!



Portions of a large experimental casting (4 x 5 feet) having nine hubs and bosses to be bored, faced, counterbored, chamfered, outside diameters turned, grooves cut inside and out, outside shoulders faced, undercut, etc. Accuracy and quick delivery were vital. Finished complete on Pratt & Whitney Jig Borer equipped with Precision Universal Tool Head. Time and cost about one-third of that required if wrenchadjusted plain boring heads had been used and makeshifts "rigged up" for turning, facing, etc.

How Does YOUR Shop Do Jobs Like These?



Pratt & Whitney have adopted the Precision Universal Tool Head and their Jig Borers are now specially arranged to fully utilize the versatility and speed of this indispensable tool.

THE PRECISION UNIVERSAL TOOL HEAD

brings all adjustments under absolute micrometric control of the operator at all times and all speeds without stopping tool or machine. It is the fastest and most accurate boring tool in existence. But more than that, it is truly universal. It faces, counterbores, turns outside diameters, mills, undercuts, recesses, backfaces, trepans and does a limitless range of "headache" jobs utterly impossible with wrench-adjusted "offset" boring tools because such tools cannot be cross-fed or adjusted while running.

Send Quickmail Coupon No. 60 for bulletins and additional information.

THE PRECISION TOOL COMPANY, Bridgeport, Conn.

ber of feeds, pieces of almost any length, from one to ten feet or longer can be cut. This cut-off arrangement has wide adaptability, such as cutting

radiator fins of any length.
Address the F. J. Littell Machine Co., 4153 Ravenswood Ave., Chicago, Ill., for any further information concerning this or other Littell equip-

ment.

Grob Metal Band Saw NS-14

An improved metal band saw designated as Type NS-14 has been added to the line of die making machines manufactured by Grob Bros.,

Grafton, Wis.

It is claimed that this machine will cut various shapes from thicknesses of steel ranging from 8-inches to thin sheet metal, with a speed range for cutting all kinds of materials from wood to the toughest high chrome alloy steel. Sturdiness, efficiency and ease of operation were provided for in the design, and there is ample toe room for the operator.

An upper door affords access to an electric brazer which is built in the upper arm and mounted on a slide. A saw blade clamp is also mounted in the frame and a file is furnished to facilitate joining of saw bands for internal sawing. It is asserted that filing the saw ends to razor-sharp tapered ends preparatory to brazing produces a better job than can be obtained by grinding. The tapered surface is said to be more accurate, and also free from oxidation.

The 20 x 20 inch table is of rigid design and tilts in two planes, an important feature when sawing clearance in dies. A slot in the table makes insertion or changing of joined saw blades an easy matter.



The table is said to have all the latest improvements as used on the Grob open end band saw. A toggle arrangement, for which patents have been applied, enables rotating the work piece without releasing the feed pressure. Another important feature is a provision which prevents too rapid feeding of the work piece. It is feeding of the work piece. It is claimed that if the saw blade cuts into an opening, it will not crash through and break by bumping against the other end, but will gently move forward, since it is checked by a hydraulic cylinder.



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New ELKONITE TIP pencil. New Baby Grand Model at a lower price.

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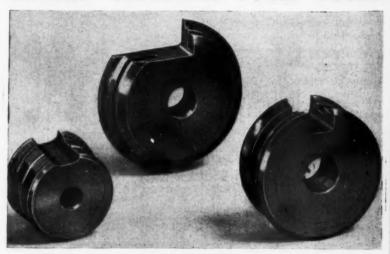
WILLIAM BREWSTER & CO., INC. New York, N. Y. 42 Church St.,

The saw guides are of modern design, of special metal which is extremely tough yet has the property of not "building up" with steel. As it will not scratch or tear the saw blade, a close fit is permitted so the blade is guided securely—a feature that makes for accuracy in following a line or cutting curves. Both guides are adjustable for height. The lower guide can be brought flush with the table, or for special jobs, several inches above the table surface. This supplies

support for the saw blade immediately above, as well as below the work piece, providing for accurate work, faster cutting and longer blade life.

Powered with a ½ h.p. motor in the base, five band saw speeds—60, 90, 135, 225 and 375 feet per minute are obtained through a silent V-belt drive. All pulleys are mounted on sealed ball bearings. Distance from floor to table is 42 inches; total height 69 inches; floor space required is 17 x 31 inches and the net weight is 1000 lbs.

GROUND CIRCULAR FORM TOOLS



Considerable of our manufacturing is turned over to the production of circular form tools for use on automatic screw machines.

Having had extensive experience on the automatic screw machine and its uses, we have made all efforts possible to insure a circular form tool service that is of real assistance to the users of the automatic screw machine. Through the cooperation of our engineering department and tool grinding department, it is possible for us, when requested, to make shipment on circular form tools in from 2 to 5 days.

Our rigid inspection by the use of the most modern equipment obtainable insures a perfect tool ready for use in your own shop.

Realizing that service and quality are far more important than price, we would appreciate the opportunity of serving you. Send Quickmail Coupon No. 69 for our catalog.

BANNER MANUFACTURING COMPANY, Inc.
1873 Clybourn Avenue Chicago, Illinois

Van Norman Heavy Duty Portable Boring Bar

Designated as the Per-Fect-O No. 777, this bar is said to be the first of its type that will take cuts at high speed, yet is light enough for one man to handle. It will bore or sleeve any diameter from 2.600 to 5.343-in., and has ample power provided throughout the entire range by a ½-h.p. capacitor motor.

The machine is a complete unit, with two feeds and two speeds, and

takes .050-in. cut at any diameter within its capacity. Heavy duty tool bits are standard equipment. Heavy duty gears are totally enclosed and self-lubricated.

No. 777 also has all the standard Van Norman Per-Fect-O features, including the four patented, non-revolving, expansible catspaws that guide the flycutter steadily all the way to the bottom of the bore, giving a perfectly finished job in one cut, without even so much as honing.

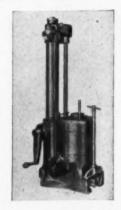
Rigid Centers Doubly Resilient T Contor is much larger and stronger

Center is much larger and stronger than the live spindle of the Rigid Center, but will break in service much quicker.

At the Cleveland Machine Tool Show, Sept., 35, we found S Lathes idle, having broken their own Dead Centers. We started all, with Rigid Resilient Live Centers, and they are still running.

Rigid Centers are Axially Resilient, due to their Undercut Necks, and Radially so due to the long taper of their Spindie rear-ends.

Rigid Tool Holder Co. 2000 Witherell St., Detroit, Michigan



There are other Per-Fect-O models which cover a work range of any diameter from 2.2 to 9-inches, and any depth from 10 to 30-inches.

Address the Van Norman Machine Tool Co., Springfield, Mass., for further information, and please mention The BLUE BOOK.



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Send TODAY for complete information on these modern high production tools.

At left, the ARMGLO Die Filing Machine which slashes 50% from the cost of sawing, filing and lapping on dies, gages, templates, cams, etc.

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Above, the new ARMGLO
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Band Finisher for fast production and flawless work
on sanding jobs, surfacing,
polishing and burning of
castings, dies, stampings,
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NEW LOW PRICES





"Short run jobs" — orders that cause most of your grief—can be handled easily and profitably with Stanley Unishears. Heavy cost of trimming dies, setting up complicated power-consuming machines is eliminated. Just plug a Unishear in and go to work, cutting any sheet material

any pattern. Learn more about these exclusive Stanley Electric Tools! Ask your distributor for demonstration on your work, or write for information. Stanley Electric Tool Division, The Stanley Works, 141 Elm St., New Britain, Connecticut.



Portable — weighs only 7 lbs., ye cuts up to 18 gauge hot rolled steel as fast as you feed; other material in proportion. Plugs in any ligh socket, makes smooth, accurat cuts, any pattern, at 2400 stroke per minute. Two other portable models.

MODEL 0-15 Stationary Unishear

15" throat, cuts up to 14 gauge ho rolled steel, other materials in pro portion. Starts inside a shee without starting holes, cuts curve down to 34" radius. Six othe stationary models cut up to 34 boiler plate.

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grade ball bearings.

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conditions. It is said to be amply

powered for fast grinding and sanding,

and for use with wire wheel brushes in cleaning metal surfaces. Cool run-

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tion, and an air filter protects the com-

mutator and motor from abrasive dust

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Model "N" is 15% inches long and

weighs 101/2 lbs. The other two models

in the Skilsaw line are the heavy duty

model "G" and the constant production model "L." All models can be used on flat, concave and convex surfaces of metal, wood, stone, marble,

Write Skilsaw, Inc., 3318 Elston

Skilsaw Special Duty Disc Sander

The Model "N" Skilsaw Disc Sander was developed to provide a lower priced, efficient tool for intermittent grinding of light welds-for sanding in repair work-for smoothing fractures in cast metal frames-for auto body and fender repair work-for removing stencils and labels from barrels and shipping cases, and similar jobs.



It is asserted that like the larger units, the Model "N" has a balanced streamlined body design which makes it easy to handle and control under all

Ave., Chicago, Ill., for further information, and please mention The BLUE BOOK.

Scherr Takes On Leitz Instruments

For many years, George Scherr Co., 128 Lafayette St., New York, has specialized on industrial precision instruments. Announcement is made that the Scherr line will be augmented with the exclusive sale of Leitz optical measuring precision instruments, including various sizes and styles of toolmakers microscopes, large and small projection apparatus, microscopes for surface inspection and also some types for metallurgical purposes. A complete line of these instruments may be seen at the Scherr showrooms. and new literature is also available on application.

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They are heavily constructed and very compact. Three flanges on the base permit easy attachment to machine or drill press table. A "V" shaped slot milled in the movable jaw permits a positive locking of vertical work. The ease and simplicity in operating makes this tool an indispensable factor in the execution of drill press operations.



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Metallizing —What It Does — and How

Every so often, a new development enters the industrial field, bringing along new ways of doing things. That's progress!

Metallizing seems to be one of these periodic innovations, and apparently it

has much to offer.

In the reclamation and salvage field, it promises the saving of many worn, scored and undersized parts from the scrap pile.



Parts that are to be exposed to undue corrosive influences may be given substantial protective coatings of zinc, aluminum, monel metal, nichrome, stainless steel, etc.

Strides are being made with metallizing in the decorative field, applying new protective and ornamental coatings to wood, plaster and other mediums.

The process is no substitute for welding. Cracked or broken parts should be reclaimed by the familiar

welding processes.

Metallizing does offer a quick and economical method of building up and increasing the dimensions of worn or undersized parts.

Some idea of the versatility of the process may be gained from the fact that almost any metal may be sprayed on practically any kind of surface. Tin, lead, babbitt, zinc, monel, copper, brass, bronze, aluminum, nichrome, nickel, and the various steels including stainless, are some of the metals commonly used.

The spraying mechanism is so compact you can hold it in your hands. It is illustrated, set up in a lathe, ready to spray a shaft. The metal in wire form is automatically fed into the ma-



chine by a little self-contained air turbine. An oxy-acetylene flame melts the wire and a compressed air jet deposits the minute metal particles on the work. The work does not have to be preheated and the process is quite spectacular, with myriads of sparks, which however, do not burn the flesh.

Ordinary jobs are cleaned and sandblasted in preparation for metallizing. The blast roughens the surface and provides minute anchorages for the

COLWELL Tool Post Turrets



increase output and value of every lathe . . . save time and money on repeat operations . . . available for lathes 9 to 18* (16* size shown) economical in first cost . . . easily applied . . . soon pays for itself.

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are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve

for pressures to 300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to

5000 lbs. Also manufacture foot, solenoid and motor-operated valves. Bulletins on request.



OTHER NICHOLSON PRODUCTS: Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

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tiny metal particles. In building up shafts that are to be subjected to heavy duty, some kind of rough thread is generally cut in the surface to afford a more substantial anchorage. Shafts may be built-up with ordinary steel and finished off with a top coat of some special wear or corrosion-resisting steel, depending on the service in which it is to be used. Incidentally, it is necessary to finish off high carbon coatings by grinding, because of their hardness. Examination of a lapped-steel-sprayed surface reveals many minute pits or pores which serve as oil retainers. Further lapping removes the surface pores but exposes others underneath.

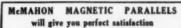
A very common and useful application is for building up bearings with sprayed-on babbitt. Usually this obviates a complete rebabbitting job, sav-

ing both time and money.

A long list of case histories shows the practicability of metallizing shafts for engines, compressors, turbines, etc. Often the emergency repairs have saved a lot more than just the salvage value of the parts in averting plant and production tie-ups.

The accompanying photos were made by The BLUE BOOK Staff Photographer at Machinists Tool Grinding Co., 3038 Van Buren St., Chicago.

Address the Metallizing Co., of America, Inc., 1353 E. 17th St., Los Angeles, Cal., for further information concerning the process and equipment. Please use your business letterhead and mention The BLUE BOOK.





Made in two sizes
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Eight No. 5 Double-type Pullmore Clutches, running in oil, transmit power to the spindles of the Partool Lathe lillustrated. This lathe, designed for continuous high production, requires for each of its 8 spindles a clutch which shall be continuously reliable with a minimum of service. Pullmore Clutches meet these requirements and provide, in addition, the advantages of durability, easy operation, and economy.

Pullmore Clutches are made in single or double types, for operation in oil or dry, in especities up to 75 h.p. Complete information on the many sizes, the over-all dimensions and capacities of Pullmore Clutches; drawings of typical applications and illustrations of equipment using these clutches are contained in the Pullmore Blue Book, which will be sent free on request. Write for a copy, today,



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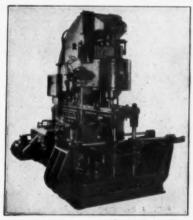
Fitchburg Vertical Internal Grinder

This planetary type, full automatic closed cycle unit was designed for grinding parts not easily handled and difficult to rotate.

The cycle is automatic from loading. work clamping, grinding and sizing, through to unloading. Control is electro-hydraulic throughout and the sequence of movements is interlocked, preventing any motion unless the pre-

The only duty of the operator is to see that the work is properly located in the loader, and trip the con-

The wheel head is anti-friction bearing equipped in all three movementsthe spindle bearing, eccentric rotation and rotation of the complete assembly.



Speed of the latter is controlled by a hydraulic oil motor with variable speeds. The eccentric has 1½-in. movement on the radius, allowing for 3-inch wheel wear on the diameter.

Wheel spindle is driven by a 3-h.p. 3600-r.p.m. motor and speed changes are handled by pick-off pulleys. Belt slack, due to eccentricity, is taken up by a slidable motor frame and connecting rod on the eccentric spindle, all of which is mounted as a unit for

vertical reciprocation.

Hydraulic control is contained in one unit, including the tank. In this, there are four oil circuits, driven by two dual pumps with a 5-h.p. 1800 r.p.m. motor. One circuit has a balancing control to act as a counterweight for the vertical reciprocation of wheel head.

The fixture, of course, is dependent on the work to be done, and may or may not be hydraulically operated. That illustrated was intended for holding motor stators and not only located by the counterbores on ends of the frames, but had a hydraulic ram with ring compressors for holding the laminated cores under heavy pressure.

The base and column are of box section and heavily ribbed for rugged duty. The ways are long, with plenty of wearing surface, with taper gib adjustment. Total weight of the machine is given as 16000-lbs.

For further information, address Fitchburg Grinding Machine Corp., Fitchburg, Mass., and please mention

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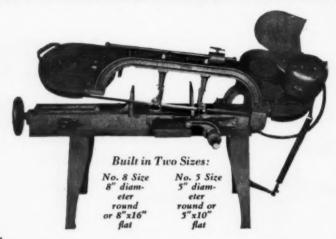
five speeds 3500-14000 R. P. M.,-\$170.00.

Motor heavy duty constant speed mounted on rubber. Spindle equipped with four precision ball bearings, always perfectly adjusted regardless of temperature or wear. We manufacture other sizes and types. Send Quickmail Coupon No. 32 for catalog.

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METAL sawing efficiency can only be obtained by combining flexibility with a positive, controlled cutting action. Wells metal cutting Band Saws are designed and built on that basis.

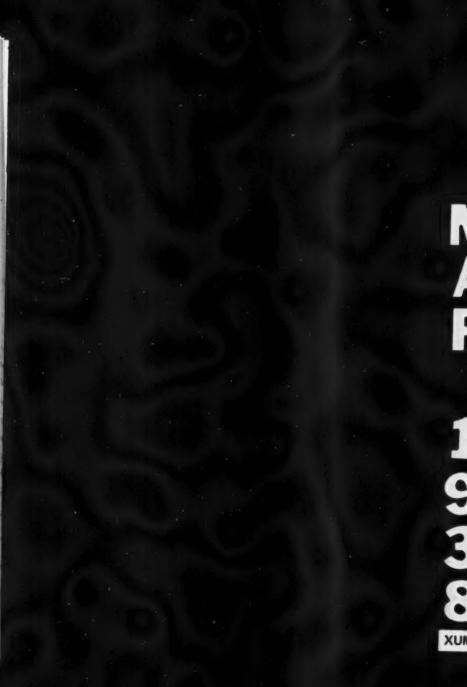
Here are some outstanding Wells features:

- · Continuous cutting action.
- · Proper blade tension in material at all times.
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- Adjustable roller bearing blade races guarantee accurate cutting and permit closer working tolerance.
- · Automatic stop at conclusion of cut.
- · Saw blade requires no coolant.
- · Portable to any position in plant where a saw is needed.

Send Quickmail Coupon No. 31 to Wells Mfg. Corp. for complete information. If so desired, a demonstration can be arranged in your plant without obligation.

Saw it the WELLS Way

WELLS MFG. CORP. Three Rivers. Michigan





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WELLS MFG. CORP.

Stick coupon on your letterhead and sign your name, title and firm name for catalogs describing Maxwell products.

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DELTA MFG. CO. 685 E. Vienna Ave. Milwaukee, Wis.	GEORGE SCHERR CO. 122 Lafayette St. New York, N. Y.	W. M. NICHOLSON & CO. Wilkes-Barre, Pa.
BREUER ELECTRIC MFG. CO. 842 Blackhawk St. Chicago, III.	GEORGE SCHERR CO. 122 Lafayette St. New York, N. Y.	Wilkes-Barre,
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OUTSTANDING TOOL VALUES

101/2" Universal Index Centers



ACTUAL SWING 11" Can be furnished right or left hand.



A new universal dividing head designed to give the utmost in a well-balanced, rigid and accurate index center. All materials and workman-ship are of the highest grade. Head stock is swivel and graduated up to 180 degrees. Head can be tilted above and below vertical and perpendicular lines. Spindle has taper bearing and is provided with take-up collar for end thrust. No. 10 B. & S. taper has large hole \$125

10½" Full Universal Dividing Head

Index Centers for Universal Milling Machines

L-W MAGNETIC CHUCK

Waterproof for wet or dry grinding A REAL MAGNETIC CHUCK that is adaptable for any purpose. Unconditionally guaranteed to furnish the highest magnetic holding power on either 110 or 220 volt direct current. Well designed and beautifully finished, highest quality workmanship throughout—complete with cord and \$45 plug—an outstanding value

Also made in the following sizes: 6½"x18"—\$60 8"x24"—\$110 10¾"x37"—\$195



Can be furnished right or left hand. Actual Swing 11"

For all kinds of indexing and spiral cutting. Swivel head stock is graduated to 180 degrees and can be tilted above and below the perpendicular. Spindle has No. 10 B. & S. taper front and back with tapered bearing and thrust collar.

4-Jaw Independent Lathe Chucks (made in 5 sizes)

Semi-steel construction with heavily ribbed body to withstand unusual





strains. Ground finish. Four independent jaws made of accurately ground and fitted hardened steel. Reversible. Has 1½" tough nickel steel screws. 12" size, weight 75 lbs.

14" independent chuck \$38.00 12" independent chuck 33.50 10" independent chuck 29.00

Working Surface 53/4" wide, 13" long. Consumes .5 Amp.

L-W also manufactures power saws, demagnetizers, vises, etc. Send Quickmail Coupon No. 36 for a catalog of the complete L-W line.

L-W CHUCK CO.

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TOLEDO, OHIO



human response to your touch

Let us send you TODAY ON 10-DA OR SEND FOR Copyright Chicago Who

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THESE OUTSTANDING ADVANTAGES MAKE

THE NEW 40 VOLT HOBART EVERY WELDING OPERATOR'S FIRST CHOICE

1. REMOTE CONTROL



Improves quality of welds 100%. Lets the operator have funger tip control of the heat and current for every job AT THE WORK. New speeds and better quality welding on every jsb. Often saves the cost of a helper.

60% GREATER CAPACITY



with these new 40 Volt Hebart Welders than with the old style 25-volt welders. Extra speed and increased volume of work brings lower labor costs Guarantees a welder that will "take it" on the new heavy duty welding

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Some welders are built to handle only the expensive coated rods Hobart handles coated or plain with minimum spatter on light work or heavy Hobart guarantees all around low cost performance,

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Hobart Volt-Amp Adjuster lets you get he exact combination of heat and current for each job. Three ranges and over 400 different combinations of welding current easily and simply obtained

OVER 400 STEPS OF WELDING HEAT

TO THE HOBART BROTHERS CO. Box TB-38 Troy, Ohio

Without obligation tell me more about the new Hobart Current Check Yours Here! Sover Models with Motor Homepower Control. Also send me the Free book I ve checked at the left. I'm specially interested in the kind of work I've listed below...

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Gas Engine Drive 10 Days' Trial and Easy Terms

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The New Hobart Motor Horse Power Control lets you save up to half the current cost on 60% of your work. Controls input as well as output Improves power factor and efficiency

7. 30 DAYS TRIAL at our risk

Find out about Hobart, The Fastest Selling Arc Welder on the Market Today, by trying one on your job at our risk



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XI

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THE MARSHALLTOWN MIGHTY MIDGET



No. 0 BENCH PRESS

A BETTER BENCH PRESS FOR DISCRIMINATING USERS

Heavier construction greater die space - nickel alloy crank - convertible clutch—improved ball and socket connection - easier adjustment - all combine to make this little giant the ideal press.

The convertible clutch allows quick changeover from single stroke to continuous operation.

ALSO OTHER INCLINABLE PRESSES-IN 8 SIZES FROM 5 TO 70 TON CAPACITY— BY THE MANUFACTURER OF MARSHALLTOWN THROATLESS SHEARS.

Phone or write-or send Quickmail Coupon No. 43 for catalog.

MARSHALLTOWN MANUFACTURING

900 East Nevada St.,

Marshalltown, Iowa

South Bend 1-Inch Collet Lathe

A new 9-inch swing lathe with a 134 inch hole through the spindle and 1 inch collet capacity is announced by the South Bend Lathe Works, South Bend, Ind.

It is of the back-geared, screw-cutting type with all engine lathe features, and was developed especially for manufacturing plants and tool rooms.

All regular attachments are available. Draw-in collet chuck attachment may be had in the handwheel type and the quick acting lever type. A six tool bed turret and double tool slide adapt the lathe to handling multiple operation manufacturing jobs. Telescopic taper attachment permits the most precise taper work. Electric grinder, chip pan, collet tray, carriage stop, milling and keyway cutting attachments are also available.

Several different types are offered in-

cluding the underneath belt motor driven model; the tool room lathe; the horizontal adjustable motor driven bench lathe and the countershaft driven lathe.



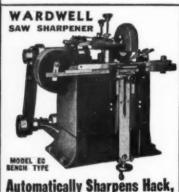
A 2-speed motor drive provides 12 spindle speeds ranging from 50 to 1400 r.p.m. The quick change gear model cuts screw threads from 2 to 112 per inch. The standard change gear model cuts threads 4 to 112 per inch. Power longitudinal feeds are .003 to .020 in., and .002 to .015 in. respectively. Four bed lengths are available—3, 3½, 4 and 4½ feet.

Designated as the new series "R" models, the new lathes feature a heat treated headstock spindle with all bearing surfaces hardened and ground; spindles of special alloy steel with phosphor bronze bearings, line bored and lapped and adjustable for wear; new double wall apron with self-oiling steel gears and a multiple disc friction clutch.

Bulletin No. 29 gives full information on the new lathe. The Technical Service Dept., will send a free copy on request. Please mention The BLUE BOOK.

JOHNSON MULTIDUTY DIE

O. Johnson Co., Brookfield, Ill., 4 pages 8½x11, presenting illustrations and a full description of the Johnson one-man die trucks and portable work benches.



Automatically Sharpens Hack, Band & Circular Saws

with teeth as fine as 32 to the inch, at a speed of 30 to 75 per minute. WRITE FOR CIRCULAR

The Wardwell Mfg. Co. 3165 Fulton Rd. Cleveland, O.



Guaranteed Stronger and Safer than Ever!

Here's a tool for you expert pipe wrench users who can't be fooled by shiny metal and ordinary guarantees—the new all-alloy RID with new design stronger housing and I-beam handle that adds still more strength to the famous unconditional guarantee. It practically stops your pipe wrench repair bother and expense.

With its replaceable no-slip no-lock chrome molybdenum jaws and unbreakable housing, you've got a wrench you can depend on for any job, in any emergency. Add the pleasure of an adjusting nut that spins freely in all sizes, 6" to 60", a handy pipe scale on the full floating hook jaw, handle that's comfortable to your hand on a hard pull, and you see why **RECOLD** is the wrench millions enjoy owning and using.

Buy From Your Jobber!

THE RIDGE TOOL CO. ELYRIA. OHIO

New Method of Cardina Belt Hooks

Armstrong-Bray & Co., 315 N. Loomis St., Chicago, Ill., announce a new method of carding their Wiregrip belt They claim this keeps each hook in exact position, speeds loading of lacing machines, maintains perfect alignment and prevents the usual waste of short ends cut from cards of hooks. With this system of carding, the desired number of hooks can be cut off easily with a pocket knife or scissors. No special tool is required.

Carded first in the usual manner, Wiregrip hooks are then anchored in position with an auxiliary card. This patented die-cut card is forced down over the hooks, giving a four-point grip on each hook.

It is asserted that hooks are held so securely they will maintain their alignment indefinitely, even though roughly handled. It is pointed out that this

should be an important improvement, if it is a fact. as reported, that a surprising number of hooks never find their way to the belts, but are lost from the cards or wasted in short leftover ends. Address the makers for any further information desired, and please mention The BLUE BOOK.

Westinghouse at Detroit Show

The Westinghouse display at the Machine and Tool Progress Exhibition, to be held in Detroit, March 9-12, will include a Flexarc Welder: section of CS motor showing details of its construction: and an array of miscellaneous equipment such as linestarters, motors, circuit breakers. safety switches, instruments, etc.

Chairman at the Technical Forums will be Mr. J. R. Weaver, Westing-house Director of Equipment.



BROS. MFG.

years of oil cup experience

1860 South Kilbourn Ave. Chicago, Ill.

Send Quickmail Coupon No. 62 for catalog

Buffalo Horizontal Bending

Several improvements are announced in the latest design Buffalo No. 3.

A more compact and trouble-free drive is provided in a main roll'drive directly coupled through a Morse chain flexible coupling unit to the vertical shaft of a Jones speed reducer.

A tight aluminum housing filled with grease encloses the chain coupling.

COMMERCIAL Centerless Grinding COMPANY

Contract Centerless Grinding
Accuracy - Prompt Service

6538 Carnegie Ave.,

Cleveland, Ohio

The vertical worm-Maag-Spur gear reducer takes the entire reduction in a single self-contained housing. All gears and bearings run in an oil bath. It is emphasized that this efficient enclosing



of the drive assures proper lubrication and excludes dust and dirt—especially desirable in view of the fact that the drive unit is in a closed pit below the floor.

MARSCHKE HEAVY DUTY



A Catalog showing machines with 10° to 30° wheels and 1 to 25 H. P. motors wil be sent promptly upon request.

GRINDERS and BUFEERS

An important item accounting for the fact that we are now manufacturing the MARSCHKE HEAVY DUTY GRINDERS and BUFFERS, is our own experience with these machines.

We have been using several different types and sizes of Marschke Grinders and Buffers for so long that "the oldest man" of the organization does not remember when they were originally installed.

Nor does anyone remember when any of these machines has given a bit of trouble and since that is the kind of machines we like to use, it's also the kind we like to make and sell.

You, too, will appreciate the dependable durability of Marschke Grinders and Buffers manufactured by

VONNEGUT MOULDER CORP. 1805 Madison Ave., Indianapolis, Ind.

A built-in oil pump on the reducer unit circulates the oil over the gears and bearings. Flexible couplings on both the motor and drive side deliver torque directly to the roll pinion shaft, cushioning the impact encountered in bending machines as a result of frequent reversals of the rolls.

Speed reduction is obtained through a combination of a worm and worm gear at the high speed end, and Maag spur gears at the slow speed end. All bearings in the unit are of the Timken

tapered type, carrying radial and thrust loads.

An adjustable roll can be had with a power adjustment by means of a compact geared arrangement with a reversible motor and controls. Motor and controls are not shown. The motor is mounted on the floor plate and the entire assembly is enclosed within a heavy guard.

Address the Buffalo Forge Co., 161 Mortimer St., Buffalo, N. Y., for further information, and please men-

tion The BLUE BOOK.

BEARING GRINDERS 6" to 12"

Complete Line BENCH AND PEDESTAL TYPES BENCH AND



\$19.50 to \$201.00 1 YEAR GUARANTEE

OTALLY enclosed, ball-bearing motors, bearings sealed in special housings to prevent entrance of dust or dirt; rotors dynamically balanced—vibration almost entirely eliminated; guards, tool rests and bases of cast iron, accurately machined and fitted.

ABOVE: No. 800-1/2 HP. 1 phase; capacitor type motor. 8x1" wheels... \$48. AT RIGHT: No. 121-2 HP. 3-phase 12*x2* wheels.

MAIL QUICKMAIL COUPON No. 18 for bulletine

BALDOR ELECTRIC COMPANY 4368 Duncan Ave. St. Louis, Mo.

BALDOR GRINDERS are built by Motor Specialists





Write today to

GROBET FILE CORP. OF AMERICA

3 Park Place,

New York City

Ask for our Catalogs

Catalog RW illustrates a great many shapes and sizes of rotary files and rasps.

Catalog NW illustrates more than 4000 different precision Swiss files.

For the First Time! Vacuum Cleaning Made Applicable to All Plant Cleaning Requirements at Low Cost With



Breuer's Ball Bearing

TORNADO

Portable Industrial Vacuum Cleaner

This new machine is designed to solve all industrial cleaning problems without the expense of installing a stationary plant or using so called portable cleaners which are too heavy and expensive for average plant applications.

TREMENDOUS POWER 1 H. P. Motor-46¹ Waterlift

Do not confuse the TORNADO with light-duty cleaning machines. Model 112 combines light weight (only 40 pounds) with tremendous cleaning power (1 H. P. G. E. ball bearing Motor -46% waterlift). Patented principle of separating fine dust from refuse and depositing heavy dirt in tank makes this cleaner as applicable to heavy duty work as the largest machines. Sturdy construction insures long life and low yearly cost.

Has plenty of power and capacity to handle dust, dirt, sand, sawdust, metal scraps, filings, etc. Attachments available for cleaning boiler tubes, ovens, machinery, walls, floors, pipes, etc. Motor unit can be quickly removed for blowing dust from motors, etc. The handlest heavy duty, low cost, time and labor saving unit ever built.

We prove TORNADO advantages right in your plant without obligation. Send Quickmail Coupon No. 30 for details of trial offer and further information or write to

BREUER ELECTRIC MFG. CO.

842 BLACKHAWK STREET.

CHICAGO, ILLINOIS

Thor U44 Half Inch Portable Drill

Twelve inches in overall length and weighing only nine pounds, yet a heavy-duty tool designed for continuous service on production-these are interesting highlights on the new Thor U44 half-inch portable drill.

Because of its compact, streamline design, it is claimed the U44 can be used in places formerly inaccessible for half-inch drilling. It may be con-

verted quickly into an accurate, sensitive drill press by mounting in a drill stand, and it is asserted that a 1/2-inch hole 2 inches deep can be drilled in steel in one minute when sufficient pressure is applied. It is pointed out that the design of the U44 permits the application of heavy pressure-even with a bar or timber against the handle -without danger of throwing the armature out of alignment. The grip handle cap assembly bears directly on the field case, which has an arch for upper bearing support, so no pressure is exerted directly against the upper armature bearing support.

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected _ save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

129 Kent Ave.

JOHN T. BURR & SON Brooklyn, N. Y.



MASTER LAMP

All Master Lamps are equipped with spring shock absorbers to protect bulbs. Ball joints are of malleable iron fittings, with safety lock pins. Wire fully concealed.

Each Lot 12 Lot 72 Height Range Wgt. Machine each each Bench 4.75 26° 3½' 5½ lbe. \$5.50 4.95 Flore \$10.00 9.00 8.75 31 3141 37 lbs. FOB Detroit, Mich.

3300 HUBBARD AVE., DETROIT, MICH.

The U44 can be supplied with 110 or 220 A.C. or D.C. universal motor, operating from any light socket. Free speed is 450 r.p.m., and full load speed, 300 r.p.m. Spindle offset is 11/4 inches.

Standard equipment includes 1/2 inch Jacobs chuck, spade handle, lever type side switch handle that can be locked

PERFORATING



WALES individual, sub-press type units for press or press brake. Capacities up to % dia. in 14 gauge _ also square and Vee notching dies.

Write for Bulletin A

1559 Niagara St.,

THE STRIPPIT CORPORATION Buffalo, N. Y.



for SENECA FALLS Automatic Pathes WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

SCHMIDT "Hi-Duty" Pneumatic MARKING MACHINE

ADVANCED BUSINESS METHODS demand improved records of metal fabrications. This machine makes marking operations quick and simple. Part numbers—order numbers—manufacturer's name and other important data marked on your products will mean permanent records, to last the life of the part, and REPEAT ORDERS, a vital part of any business.

The Schmidt Model 25, illustrated at left, is a light, general purpose hand marking machine, with a supplementary air cylinder to take the place of the foot pedal in raising the work to the lettering tool. Air from the shop line is used, and the four-way foot valve assures fast operation. This machine uses solid flat or round dies as well as the adjustable type, in a flat or knurl type holder. The use of the air cylinder, by reducing operator fatigue, greatly increases production on continuous marking operations.

MODEL 25 (Side view shows air cylinder)

SPECIFICATIONS

Will mark flats or irregular surfaces up to 4" thick.
Will mark rounds up to 10" diameter, or bars up to 4" diameter.
Carriage or Die Stroke 21½"
Throat—Center of die to front of uprights 3"
Roller Bearing Die Silde. 3"
Roller Bearing Die Silde. 4"
Table Rise—Low to High Position. 4"
Table Rise by Air Cylinder
Table Pressure 2400 lb. at 75 lb. line pressure.
Table Dimensions 5½" x9½" with 2"x4" slot.
Operates on line pressure of 30 lb. to 100 lb.

Send Quickmail Coupon No. 70 for complete catalog of our full line of Marking Tools, Machinery and Equipment.

GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill. Builders of Marking Equipment Since 1895. for continuous operation of the drill and 10 feet of 3-conductor molded rubber cable with ground wire.

The U44 can be furnished with keyless chuck, No. 1 or No. 2 extension Morse taper shank if desired, as extra equipment.

Every moving part of the U44 revolves on one of the eight precision ball bearings. Spindle and lower armature bearings are tightly sealed so grease cannot enter the field case from the gear case, or be thrown out around the spindle. The upper armature bearing is sealed in grease. Field case, handles, center plate and gear case are die cast from high grade aluminum alloy. Gears and shafts are made from hardened and ground alloy steel.

The switch is of two-pole construction, completely enclosed in the safety lever handle, and the entire switch is wrapped in fibre sheet for double protection against grounds and shorts. Switch trigger is conveniently located, and provided with a lock so it may be used as a safety switch or as an offand-on switch. Two screws release the cover plate for access to the switch.

The armature is said to be large in proportion to the tool size. It is made up with hand formed coils, separately wound with triple insulation. Lamination has "U" shaped slots providing extra room for this insulation. Commutator is mounted on a brass sleeve, locked with a threaded brass nut to provide for uniform expansion and contraction. This construction is

claimed to prevent loose or raised bars, and to make for longer, trouble-free service.

Disassembly and reassembling are said to be easy. Removal of one screw exposes the brushes.

Address the Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, III., for further information. Please use your business letterhead and mention The BLUE BOOK.



HARD USAGE Doesn't Phase The HARTFORD MILLING VISE



We also Build Machinery on a Contract Basis, Design and Develop Special Automatic Machinery—Gears and Cams Cut to Order. Because it was designed to "take it"—and it dots! It will tand up, day after day, under the heaviest, toughest strain of production milling work. Made of the best materials, with all parts interchangeable, it will outlast four or five ordinary vises. Rapid and accurate in operation—the top eccentric handle gives tremendous binding force, while the lower camfaced handle gives instantaneous quick-opening and return. A trial in your shop will coawine you better than anything we might say.

Write for Folder and Complete Details

Jaw width 5' Maximum opening 3½'
Jaw depth 1½' Weight 40 lbs.

Also made in the swivel-jaw type with hard or soft jaws, maximum opening 2½*.

HARTFORD SPECIAL MCHY. CO

HARTFORD SPECIAL MCHY. CO. 285 HOMESTEAD AVE., HARTFORD, CONN.



No. H56C GREENERD

Self-contained 4 ton Hydraulic Press adaptable for broaching, assembly work, etc. Speed of ram, 200 inches P. M.; daylight, 16"; adjustable ram stroke from \(\frac{1}{2}" \) to 16"; receives up to 12" diameters. Write for Bulletin No. 101.

We also make 65 styles of hand operated and hydraulic presses. Write for general catalog.

GREENERD ARBOR PRESS CO., INC.

41 Crown Street

Nashua, N. H.





BUSHINGS

STANDARDIZED

Prompt delivery from stock on over 10,900 standard items—over 6700 ACME Standard—over 4200 A. S. A. Standard—all completely finished ready for use. Special sizes made to order.

Made in our new plant by the most exacting and scientific methods—insuring accurate fit plus long wear—concentric within .0003" full indicator reading.

Types shown at right, top to bottom, are: plain stationary press fit, type 'P'; shouldered stationary press fit, type 'S'; removable slip, type 'R'.

Send Quickmail Coupon No. 39 for bulletin containing complete data and low prices. Satisfactory service quaranteed.

ACME Industrial Co. 210 N. Laflin St., Chicago, III.





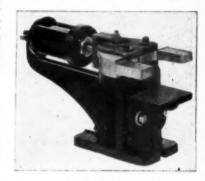


Air Operated Knu-Vise

In addition to their line of manually operated knuckle action vises, Knu-Vise Products Co., 6432 Cass Ave., Detroit, Mich., now offer a unit employing air for motive power. The special two inch cylinder has a stroke of 44 inch, and is stated, with 65 pounds air pressure, to develop a pressure of over 1000 pounds, at the center of the jaws.

Bushing plates and angle brackets may be obtained, also the necessary two-way valves for hand or foot control. Maximum width between the two jaws is three inches, but special jaws can be made for individual needs at nominal cost. Length of the standard jaws from face of the housing is two inches. Supplied with each vise is one blank piece of steel, attachable to the jaws by cap screws, which can be machined to take any given piece of work.

Maximum jaw movement between open and locked position is ¼ in. The type illustrated is known as AKV-138,

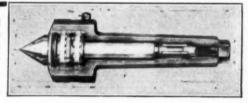


and the angle bracket shown below the jaws, and bushing plate, are extras.

Overall width of the unit is 51/4 in.,

Here is a tool especially adapted for unusually heavy work. It is equipped with a combination of precision type roller and ball bearings to assure the rigidity and maximum capacity for high speed production and longest possible service.

Bearings can be renewed if necessary at slight cost. Tests in your machine shop will quickly demonstrate the precision, low maintenance cost and the durability that have established the "Nielsen" reputation. Write for catalog showing our line of improved live centers and tailstock spindles, with adjustments to take up wear and preload the bearings.



NIELSEN HEAVY DUTY Live Centers

Manufactured by

NIELSEN INCORPORATED LAWTON, MICHIGAN



Janette





Type RW4P—a slow speed_right angle shaft_worm and combination worm and planetary gearing type of speed reducer. Motorized Speed Reducers

A PRECISION BUILT LINE
OF
16 DIFFERENT TYPES

1/20 to 7-1/2 H. P.

The diversity of the Janette custom-built line of motorized speed reducers enables us to supply a machine for almost any purpose. Let our engineers help in selecting the right type for your application.

ROTARY CONVERTERS - BLOWER WHEELS - MOTOR GENERATORS

Janette Manufacturing Company
556-558 West Monroe Street Chicago, III. U.S.A.



\$9750

Model AA—complete with 7° silicon carbide roughing and finishing wheels and combination protractor and light.

PROSSER



CEMENTED CARBIDE

10 DAYS FREE TRIAL

Here's a grinder that will greatly increase the service of your cutting tools—at a moderate price. It handles all operations of rough grinding and finishing carbide, high speed, cobalt high speed steel and Stellite. Write for details.

THOMAS PROSSER & SON

120 WALL STREET

NEW YORK CITY

height is 61/2 in., and total length 12 in.

These vises were designed to provide rapid insertion and withdrawal of the work pieces that are always in plain view of the operator. Ample chip room is provided.

For further information, address the makers on your letterhead, and please mention The BLUE BOOK.

Weld EISLER WELDERS

SPOT WELDERS
BUTT - WIRE - SEAM
A. C. ARC WELDERS
Welders as
low as \$25.00
Submit samples for
test-no obligation.

Submit samples for test—no obligation. EISLER ENGINEER-ING CO., Iac. 746 So. 13th St. Newark, N. J.



Putnam Universal Grinding Fixture

The Putnam Tool Co., Detroit, Mich., has recently introduced a new swivel type grinding fixture for use in sharpening end mills and other cutting tools.



The operation is based on the same principle as grinding between centers, with the horizontal motion controlled by the movement of the machine table.

The holding unit of the fixture is of ball bearing construction and revolves

BEFORE BUYING



- 1—Size and shape of bearing block?
- 2-Overhang or distance from shank to boring bars?
- 3-Simple or complicated design?
- 4-Accuracy or readability of dial screw?
- 5-Range of boring jobs?
- 6-Are boring bars, wrenches, etc. included?

7-Is the price reasonable?

CRALEY OFF-SET BORING HEADS

meet all your requirements. Made in 7 sizes for everything from the smallest holes up to 20° diameter.

Write for full information.

C. C. CRALEY MFG. CO., SHILLINGTON, PA.



USEFUL_

In Any Modern Shop

Surely you can find many uses in your plant for a substantial, well-built Surface Plate. The type illustrated is 36x48 inches and the selling price is \$125.00. It is made of semi-steel, accurately machined. Legs are drilled and tapped for adjusting screws—complete with screws. Weight, 1000 lbs. Should you desire a

larger or smaller one, will be pleased to quote on your requirements.

Write TODAY for full information.

J. C. BUSCH COMPANY

E. Pittsburgh Ave. and So. Ferry St.,

ENGINEERS AND MACHINISTS SINCE 1907

MILWAUKEE, WIS.



at the slightest finger touch. The tool is securely locked in this unit and is always in exact position while being ground. Eight units are furnished with each fixture to cover the entire range of end mill sizes from is to two inches diameter.

The unit is claimed to be extremely flexible in operation. Designed primarily for sharpening end mills, it may be used in regrinding a wide variety of cutting tools. Turning the fixture at a right angle to its usual cutting position on the table, it is said that end teeth may be ground perfectly. As can be noted by the graduations, the top section of the fixture—of which the holding unit is a part—may be adjusted for grinding the tool at an angle. Any desired taper can be obtained.

The swivel arm of the fixture carries the tool completely away from the wheel. When the tool is being inserted or removed, it is pointed out that more than adequate room is provided to allow the operator to make the change without difficulty or chance of injury to his hands. When the swivel arm is pulled back, it is never necessary to change the setting of either machine or fixture.

NEOPRENE NOTEBOOK

E. I. Du Pont de Nemours & Co., Wilmington, Del. First issue of a new four page bulletin series, giving engineering information, laboratory data and useful facts concerning the product.



HANDY RACKS SAVE TIME and MONEY

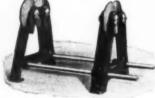
Tremendous capacity between the knees and shoulders of a man's height and in small floor space. No stooping, stretching or back-breaking. Very valuable in connection with supplying stock to automatic screw or parts-machines.

30 days approval if you wish.

Write today for details.

Wm. S. Yohe Supply Co. 583 Mahoning Rd. N. E., Canton, O.

ANDERSON Improved Balancing Ways



Every shop handling rotating parts needs this simple, sturdy, dependable device for balancing, straightening and truing operations. Saves time and trouble and assures better work.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

Write NOW for full information.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000

ANDERSON BROS. MFG. CO., ROCKFORD, III.
1907 Kishwaukee St.

Handee Grinding and Polishing Kit

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill., announce a novel chuck type mandril, with quickly renewable grinding and polishing points.

Three different types of accessories are provided. The convenient conical shape of the grinding point helps in reaching hard-to-get-at places. It is made in a grain and grade combination suitable for most types of work. In many cases it is said to eliminate the need of mounted points, and proves its worth for use on flexible shaft and portable tool equipment. Mounted in a lathe, the grinding point can be dressed to shape for cleaning centers.

The set includes a rubber polishing point, incorporating in the bond, five different types of polishing compounds, permitting a high mirror finish being



generated on a metal surface with minimum effort. It is claimed that the point affords sufficient grinding action to obliterate grinding marks scratches from the work. It is asserted that much of the hand drudgery in the finishing of tools, dies, jigs, fixtures, etc., may be eliminated with this accessory.

The felt polishing point is designed for work on radii and may be loaded conventional polishing compounds. High color can be given any metal surface.

The special chuck mandrel permits the use of the accessories down to the very last. It is said to be perfectly balanced and it is easy to change the grinding and polishing points without removal of the mandrel from the chuck of the tool in which it is used.

For further information, address the makers on your letterhead, and please mention The BLUE BOOK.

Hamilton Elevating Tables

enable one man to handle dies that would otherwise require two or three men to lift.

Send for illustrated circular.

The Hamilton Tool Co.

Hamilton, Ohio



IT TURNS WITH WORK



Save driving power and do better work with Sturdimatic heavy duty, high speed live centers for lathes, grinders and milling machines. Lowest possible overhang.

Sent on free trick Write for information.

STURDIMATIC TOOL CO. 5224 Third Ave., Detroit, Mich.



GAS ENGINE DRIVE WELDERS

Hobart Bros., Troy, Ohio, 4 pages, 81/2x11 on the Hobart gas engine drive welder and another of the same size on the new heavy duty gas engine drive.

FORMICA GEAR BOOK

The Formica Insulation Co., Cincinnati, Ohio-40 pages, pocket size, illustrating, describing and giving specification and performance characteristics of Formica Gears.

BERKELEY MOTORIZING

EOUIPMENT

The Berkeley Engineering Co., 1381 East 17th St., Cleveland, O. 12 pages. 8½x11, two-color, presenting picto-rially a very complete series of 33 different Berkeley motor drive applications to all types of machine tool equipment - also illustration of Berkeley floating disc valves for air and hydrau-

VERSON ALLSTEEL PRESSES

Verson Allsteel Press Co., 9303 South Kenwood Ave., Chicago, Ill. 16 pages, 8½x11, two-color offset, pro-fusely illustrated, giving details and specifications of the many different types of Verson Allsteel presses, reels, air and hydraulic clutches, pneumatic cushions and counterbalancing cylinders.

SOUTH BEND LATHE CATALOG South Bend Lathe Works, 767 East Madison St., South Bend, Ind.,-general catalogue No. 97, 72 pages, pro-fusely illustrating and describing the entire line of back-geared, screw-cut-

ting, metal working precision lathes. NIAGARA PRESSES, PUNCHES AND SHEARS

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y., 64 pages, pocket size, 4x53/4, profusely

illustrated, covering a full line of presses, punches, squaring and rotary shears, folders, brakes, roll formers, beading machines, seamers, etc.

BROWN & SHARPE PLAIN

GRINDING MACHINES

Brown & Sharpe Mfg. Co., Providence, R. I., 8 pages, 81/2x11, elaborately illustrating and presenting a very complete description of the mechanical features of the new Nos. 20 and 22 electrically controlled 10x18 and 10x36 plain grinding machines.

HANNA ENGINEERING WORKS Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill. Catalog No. 226, 24 pages and cover-81/2x11giving illustrations, capacities, dimensions on the complete line of Hanna cylinders, hoists, valves, etc. presenting a lot of information on pushing, pulling, raising and lowering equip-

UNIVERSAL HAND BRAKE

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill., 4 pages, 81/2x11 illustrating and detailing the new Chicago Universal steel forming. press, with specifications and information on extra equipment.

GORTON VERTICAL MILLING MACHINES

George Gorton Machine Co., Racine, Wis., 20 pages, 8½x11 — elaborately illustrating and completely describing the new Gorton super speed vertical milling machines and their performance capabilities.

WYCO FLEXIBLE SHAFT MACHINES

Wyzenbeek and Staff, Inc., 838 Hubbard St., Chicago, Ill. 20 pages and cover, 81/2x11, illustrating and describing the full line of Wyco flexible shaft machines and equipment.

A PRECISION DIE HEAD

21 SIZES 3/8" to 9"

Model F

This stationary Die Head is time tested — used on all types of machines. Head opens at end of cut — adjustment to cut as little as 3/32" of thread.

Write for data



RICKERT SHAFER CO., Erie, Pa.

The New RACINE UTILITY SAW



This is the Wet Cut High Speed Model. Hydraulic feed—6x6" capacity — a remarkable machine at a very moderate price.

We also make heavy duty Hydraulic Feed machines – $10x10^8$ – $10x16^8$ – $12x12^8$ – $13x16^8$ – $14x20^8$ and the Racine Shear Cut, Screw Feed Production Saw, Racine Duplex band saws, etc.

Smooth quiet performance Swivel vise—quick acting Hydraulic Feed and Control The last word in simplicity High Speed and Medium Speed for cutting 90% of all steels.

"STANDARD THE WORLD OVER"

RACINE TOOL & MACHINE COMPANY

1754 STATE ST.

-2-

RACINE, WIS. U. S. A.

ERIE HAMMERS AND TRIM-MING PRESSES

Erie Foundry Co., Erie, Pa. 12 pages 3½x6½ on the Erie line of single, double frame and self-contained forging hammers.

IANETTE GENERATORS

Janette Mfg. Co., 556 West Monroe St., Chicago—4 pages, 8½x11, giving complete data on the many different types and sizes of Janette A. C. and D. C. generators.

MACHINE TOOL SHOP EQUIPMENT

Atlas Press Co., 1819 North Pitcher St., Kalamazoo, Mich. 32 pages, 8½x11, filled with information pertaining to Atlas shapers, lathes, grinders, drill presses, hydraulic and lever presses, tools and accessories.

MIDGET MILLING CUTTERS

Severance Tool Mfg. Co., Detroit, Mich. Catalog No. 11, 12 pages 8½x11 listing 170 standard tools carried in stock. Booklet 11A, 5½x8¾, 12 pages illustrating and describing many special tools and their uses. Bulletin 11B lists tools in sets.

ROSS OPERATING VALVES

Ross Operating Valve Co., 6486 Epworth Blvd. Detroit, Michigan— 16 pages, 6x7¾—presenting in question and answer form the important facts concerning the Ross valves.

PNEUMATIC DIE CUSHIONS

Dayton Rogers Mfg. Co., Minneapolis, Minn. 30 pages on the improved Universal Pneumatic Die Cushions including engineering data, applications and actual installations, production records, etc.

LINCOLN ELECTRIC WELDING

The Lincoln Electric Co., Cleveland, Ohio. A 32-page, 8½x11 bulletin, entitled "How to Change Over to Welded Design for Profits." Profusely illustrated, it shows many products formerly built by some other method and their arc welded counter-parts.

TAPPING MACHINES AND TAPPING HEADS

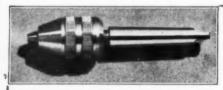
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill. $8\frac{1}{2}\times11$, 12-page catalog (No. 37), giving complete information on tapping machines and a 6 page bulletin, same size, covering the Procunier sensitive, high speed drill press tapping attachment.

CENTURY MOTOR HANDBOOK

Century Electric Co., St. Louis—24 pages 8½x11 entitled "Some Things We May Have Forgotten About Motors." Electrical characteristics of all types of fractional h.p. motors are given—adaptability of motors to the jobs and features which make various types stand up under normal or abnormal conditions.

VAPOCARB-HUMP

Leeds & Northrup Co., 4902 Stenton Ave., Philadelphia—36 pages, 73/4x10½—on the triple control method for heat treatment of steel, explaining fully the advantages of complete control of tool surface, shape and structure, with typical installations, diagrams, charts and pictures of products hardened by this method.



NIELSEN, INC.

DRILL CHUCKS

With Hardened Steel Jaws

Capacity 0 to 1/4 fitted with No. 1 or No. 2 Morse taper shank \$1.25 ea.

No. 1 or No. 2 Morse taper shanks with 1/2" x 24 thread 73c ea.

Chucks without shanks . . 52c ea.

WHY PAY MORE?

KNUCKLE ACTION HOLDING FIXTURES

Knu-Vise Products Co., 6432 Cass Ave., Detroit, Mich. A 12-page loose leaf, 8½x11, illustrating, describing and giving dimensions and specifications.

PUNCHES, SHEET METAL

W. A. Whitney Mg. Co., Rockford, III. A 40 page loose leaf book, 43x834, giving complete information on the various types of punches made by this Company.

TOGGLE DRIVEN BEAM PUNCHES

Beatty Machine & Mfg. Co., 954 150th St., Hammond, Ind. 12 pages, 8½x11, illustrating and describing the Beatty line of Toggle Presses, giving specifications, performance data.

A. E. F. SPOT WELDER

American Electric Fusion Corp., 2610 Diversey Ave., Chicago, Ill., 8 pages 7½x10½—in color, showing and describing the line of A. E. F. heavy duty spot welders.

BRIDGEPORT MILLING ATTACHMENTS

The Bridgeport Pattern & Model Works, 52 Remer St., Bridgeport, Conn., 8 pages, 8½x11 in two colors, illustrating the ¼ and ½ h.p. Bridgeport high speed milling, drilling and boring attachments, with specifications and extra equipment recommendations.

COVELL NO. 15 SURFACE

Covell Mfg. Co., Benton Harbor, Mich. 4 pages, 8½×11, two-color, illustrating and describing the new Covell No. 15 hand feed surface grinder.

BROWN LATHES

Brown Machine Co., 14 North May St., Chicago, 16 pages, 8½x11, loose-leaf, with pictures and a very full description of the Brown line of lathes, with attachments and accessories.

JOHNSON FRICTION CLUTCHES
The Carlyle Johnson Machine Co.,
Manchester, Conn. 10 pages 6½x9¼,
illustrating, describing and giving complete sizes and specifications on
lohnson friction clutches.



ESSEX Lubricating Devices

Representative examples of the complete ESSEX Line of lubricating devices and accessories—for every oiling need. Practical—dependable—economical—their popularity is based on solid performance.

Catalog No. 7, showing our extensive line, mailed on request.

"We Oil the Wheels of Industry."

ESSEX BRASS CORP., 2000 FRANKLIN ST., DETROIT, MICH.

Screw Machine REBUILDING



That Leaves NO SINGLE PART UNTOUCHED

Incorporating features such as these:

- Spindles fitted with ultra-precision taper roller bearings.
- Hardened and ground dove-tail cross-slides.
- Hardened and ground S.A.E. 6145 chrome vanadium steel helical gears on all spindles.
- All main tool slides fitted with hardened and ground bearings.
- Unconditional guarantee for serviceability and for index accuracy to within .002 on both vertical and 450 block tests.

Learn how ANY of your screw machines can be rebuilt to modern standards of efficiency. Write for full information—without obligation, of course—or visit our booth at the A.S.T.E. Machine and Tool Progress Exhibition.

MODERN COLLET AND MACHINE CO.

403 Salliotte St., Ecorse, Mich.

ACE MOTOR DRIVEN SPOT

Pier Equipment Mfg. Co., 631 Cross St., Benton Harbor, Mich. 4 pages, 8½x11, illustrating the new automatic motor driven series of Ace Spot Welders, giving complete mechanical details and specifications.

HUMM SAFETY STAMPING EQUIPMENT

John Humm Tool & Machine Co., 253 Sheffield Ave., Brooklyn, N. Y. 8 pages, 8½x11—illustrating and describing the Humm single stroke safety attachments, safety sweep guards, two-hand starting devices, with instructions and suggestions for installation.

CONTOUR MACHINING

Continental Machine Specialties, Inc., 1301 So. Washington Ave., Minneapolis, Minn. 6½x9½, 110 page, plastic bound handbook with handy index tabs, covering very thoroughly the subject of DOALL sawing, filing and polishing, with a great number of typical jobs and methods of handling them.

ROTARY FILES

M. A. Ford Mfg. Co., 413 Pershing Ave., Davenport, Ia. 24 pages, 8½x11—explaining methods of manufacture, illustrating many typical uses and showing a great many of the numerous stock designs of rotary files.

THREADING MACHINES

The Geometric Tool Co., New Haven, Conn.—4 page bulletin, 8½x11, presenting the important facts concerning the No. 14 Geometric Precision Threading Machine.

CARROLL Universal Dividing Heads 20 Years of Popularity, 6*, 104,8* 120 Swing, Right or Left Hand Type.

WM. CARROLL & SON 1776 Lexington Ave., Cincinnati, Ohio

Libert High Speed Shear

Libert Machine Co., Green Bay, Wis., announce a new high speed shear, designated as model 1036. A special lower cutting head is said to permit extreme flexibility in cutting formed pieces of sheet metal. It is especially adapted to trimming the flash from stampings after the first draw. It is claimed that the use of this shear eliminates the cost of trim-

SHELDON

Arbor Presses Made in 12 sizes from % to 10 tons Pressure.

Plain and

ming dies. Use of the 1036 is asserted to be profitable on short runs, or when the formed piece is of rather large or bulky shape, such as automobile fenders shown in the illustration. The makers point out that the unit is not



Also Drill Press Shaper Vises. Send for Catalog and Price List.

Swivel Milling Machine Vises 4 sizes-3½ to 8½ inch Jaws

SHELDON MACHINE CO. 3257 Cottage Grove Ave., Chicago, III. a special machine entirely, as it can be used for cutting irregular shapes from sheet metal the same as any standard Libert high speed shear. No starting holes are required for inside cutting. and the metal is sheared rather than



GEARS IMMEDIATE DELIVERY IN STOCK-

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 70

CHICAGO GEAR WORKS, 769 W. JACKSON BLYD., CHICAGO, ILLINOIS

punched. It is claimed that the machine is absolutely accurate, and that no further finishing is required after cutting. It will cut on a formed radius as small as % in., up to 90 degrees.

For further information, write the makers, and please mention BLUE BOOK.

Speedmaster Wide Range Variable Speed Transmission

Continental Machine Specialties, Inc., 1301 Washington Ave., South, Minneapolis, Minn., announce an infinitely variable speed transmission, giving an exceptionally wide range.

A 6-1 speed variation is claimed for this single unit. It is a companion to another Speedmaster product recently announced, which provides a 40-1

variation.

The new unit is self-contained and may be installed between the motor and the driven machine. A handwheel is provided for changing speeds, and a supporting angle frame facilitates

SPECIALTY

Special blank, pierce and form punches and dies.

What are your requirements? Let us quote you.

MASTER TOOL & DIE CO., INC. 3302 HUBBARD AVE., DETROIT, MICH.

mounting. The special Bakelite pulleys run on a hardened and ground spindle and Oilite bearings.

All standard makes of V-belts are



adaptable to this transmission, and the Bakelite pulley faces assure long belt life. It is asserted that the pulleys do not generate static electricity. Belt removal is simplified by the stub shaft pulley mounting.

The pulleys shown are 61/2 inches outside diameter. The identical unit is available with pulleys 41/2 or 31/2 in. Thus, the units may be used for fractional h.p. installations or for driv-

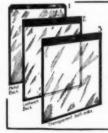
ing with 4 or 5 h.p.

Mounting of the motor is rigid. The Speedmaster is merely inserted between motor and input shaft, making a simple, compact, highly efficient installation.

The unit has broad applications wherever power is to be delivered with an infinite selection of speeds over a

6-1 ratio.

Address the makers on your business letterhead for further information, and please mention The BLUE BOOK.



WADE Shop Envelopes

Protect shop orders and blueprints. Any size or style to order. stiff or flexible. Get folder and quotation

Wade Instrument Co. 1663-H E. 118 Street. Cleveland, Ohio

V16 Doall Contour Machine

A new low priced model has just been placed on the market by Continental Machine Specialties, Inc., 1301 Washington Ave., S., Minneapolis, Minn.

It is designated as the "V16" because of its new 16-inch throat capacity and two ranges of infinitely variable speed.

It is styled on the lines of the Metalmaster, and incorporates many features of the larger machine, such as automatic butt welder built-in, and four-way tilt table.



It is of heavy welded steel construction. When filing, the machine has a new file backing member which makes it unnecessary to remove anything for internal filing operation.

The lower range of speed is from 75 to 450 feet per minute. The upper range is from 450 to 2800 feet per minute. Thus shops may handle production sheet metal fabricating on this new machine tool, as well as Doall tool room work. As on previous models, a Job Selector tells the correct speed for each job, whether sawing, filing or polishing.

Address the makers on your letterhead, for further information,

Detroit Chapter Elects Officers

Floyd W. Eaton, Supervisor of Apprentices, Burroughs Adding Machine Co., was elected Chairman, Detroit Chapter, American Society of Tool Engineers for 1938, at the February meeting last week. Charles W. Thiede, Chief Tool Engineer, Chrysler Corp., was named Vice-Chairman. Ralph M. Smith, Process Engineer, Detroit Gear & Machine Co., was elected Secretary. George W. Demarest, in charge of Plant Layout and Process at Packard Motor Car Co., was named Treasurer.

Election of officers preceded a paper on the application of plastics by John Slater, Detroit representative, Tennessee Eastman Co. He forecast the availability of telephones in colors to match milady's boudoir, and the

"ALNOR" Pyrometers

For every requirement

Inexpensive-accurate-durable

For over 15 years "Alnor" pyrometers have been the choice of thousands of both large and small shops everywhere. Because of their lower price and compact size "Alnor" wall type pyrometers are extensively used for indicating temperatures of molten lead, babbilt, tin and die cast metals, heat treating furnaces, for flue gas temperatures, and similar service. Also other types of portable and wall pyrometers for every requirement, Write for Catalog.

Illinois Testing Laboratories, Inc., 150 W. Austin Ave... CHICAGO, ILL.



elimination of glass for such parts as instrument board dials, etc., through the use of plastics.

According to Mr. Slater, the success of any plastic job is largely a question of dies. Plastics of almost any desired physical characteristics are available today. Insert casting or molding of plastics, such as bezels molded directly around glass, presents no difficulties with modern equipment.

Mr. Slater's talk was followed by a color motion picture dealing with the injection molding of plastics, presented by J. F. McIntyre of Reed-Prentiss Co., to the 250 A.S.T.E. members and guests.

Ford R Lamb, Executive Secy. of the A.S.T.E., announced that well over 130 exhibit spaces in the Machine and Tool Progress Exhibition had already been assigned and that applications are still being received.

GO ON and ON and ON!

Type W 1¾' to 14' Bores. SHUT DOWNS CAUSE GREY HAIRS AND MAKE PROFITS MELT AWAY.

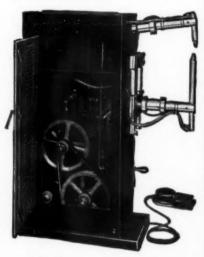


L-R COUPLINGS
with their resilient but
TOUGH cushions catching
every stress will relieve you

of this hazard. Write
LOVEJOY FLEXIBLE
COUPLING CO.
5026 W. Lake St.,
Chicago, III.

New Series Ace Automatic Spot Welders

Pier Equipment Mfg. Co., 816 Cross St., Benton Harbor, Mich., announce a new series of Ace motor driven automatic spot welders. Providing control over the welding variables essential to efficient, uniform production, increased output and decreased effort are claimed for the new models.



Reeves Vari-Speed transmissions are used, affording a 3-1 speed variation of mechanical weld timing control whereby welding time can be set to as

All That The Name Implies

JOHNSON MULTI DUTY DIE TRUCK

Will render safe, speedy and efficient service in the Tool Room, Die Vault, Press Room or any other section of your plant where heavy loads are to be transferred, raised, lowered or supported. One man can easily separate dies weighing 1000 pounds or more.

Reduce overhead by cutting handling costs—send TODAY for complete information.

O. JOHNSON COMPANY, Brookfield, III.



fast as 1½ cycles or 1/40th of a second, giving precision of pressure application and accuracy of timing said to be available heretofore only in high-priced equipment. Once set, the welding time and pressure are the same on each weld, assuring the consistency and dependability of welds essential to quantity production. It is asserted that tests on the simplest sort of welding jobs have shown savings up to 50% in labor costs.

The power drive is a self-contained unit consisting essentially of the motor, Reeves Vari-Speed drive, double reduction V-belt drive, pin-type clutch and magnetic clutch trip. The clutch is actuated through a magnetic unit controlled by a foot switch, attached to a rubber covered cable, placed wherever convenient, leaving the operator's hands free.

Speed of operation is adjusted through a crank extending through the lower front part of the welder, which adjusts the Vari-Speed transmission. Standard units are made for speeds of from 40 to 120 strokes per minute. Higher speeds are available on special order. Connecting rod has provision for adjusting length of stroke to 1, 1½ and 2-inches.

Four sizes are available—15, 20, 30 and 50 Kw. capacities.

Emphasis is placed on their versatility in the wide range of gauges and materials that may be welded. It is stated that materials as light as .005 in. can be handled with the same size welder that will also satisfactorily accommodate up to two thicknesses of 8 gauge stock. The welding capacity of the four series is based on welding materials at their maximum speed of 120 strokes per minute.

Detailed information and prices on this equipment may be obtained by communicating direct to the maker.

Exhibiting The Pioneer Line

Pioneer Engineering & Mfg. Co., 31
Melbourne Ave., Detroit, Mich., will
display their products at the A.S.T.E.
Exhibition in Detroit, March 9-12.
During this time, the plant will also
hold "open house." The latest developments in Pioneer coolant, lubricant
pumps and accessories will be shown.
Units of various types will be displayed in operation. In charge of the
booth will be President and General
Manager, A. M. Sargent; Chief
Engineer, E. M. Beyma; Hydraulic
Engineer, Howard Himes and Sales
Engineer, H. French.



M-B "HEAVY DUTY" AIR GRINDER

3 Ranges of Speed

25,000, 45,000 and 65,000 R. P. M.

Streamlined, designed for utmost case of handling and control of air.

M-B PRODUCTS



3 Stages of Power

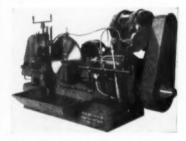
With maximum rating of over ¼ H. P.

Furnished with adapter for use in tool post of machine for internal jobs.

139 E. LARNED ST. DETROIT, MICH.

Cochrane-Bly Non-Ferrous Billet Saw

The Cochrane-Bly Co., Rochester, N. Y., announce a new machine for sawing billets, tubes, and bars of aluminum, brass and other non-ferrous alloys up to 9 inches in diameter.



The machine is driven through a double multiple disc clutch and hardened alloy steel gears, hardened steel worm and phosphor bronze worm gear, all running in oil. All drive shafts including the saw spindle are mounted in anti-friction roller bearings.

The machine has a sliding gear transmission affording four cutting speeds of approximately 250-370-485 and 600 ft. per minute.

A self-contained hydraulic unit gives hydraulic feeds of from 0 to 100 inches per minute. Adjustable stops in both directions give automatic trip and rapid return traverse of carriage.

The machine is equipped with a compound toggle, hydraulically operated clamp with two adjustable clamp screws.

Due to the high operating speed, chips accumulate rapidly, and a large chip pan is provided, with sloping sides for easy removal of chips with hoe or shovel.

A heavy steel feed trough receives the billets from crane or loading table, and a truck, chain and sprocket operated under the trough, feeds the billet into cutting position. The machine operates a special blade 30 inches





Shur-Grip Jaws 5-in. wide, hardened, reversible; open 5-in. Hold round, square and odd shapes—usable three ways. Satisfaction guaranteed—price, only \$12.50.

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Lathes, Shapers, Milling Machines, Drill Presses, Power Saws and other cone pulley machines.

Full-floating, vibrationless motor carriage with constant automatic belt tightener—and other advanced features. A simpler, smoother, better drive at a reasonable price. Send for full information.

Jobbers and Distributors Wanted-Protected Territory Available.

DIRO DRIVE MFG. CO., 1461 S. Michigan Ave., CHICAGO, ILLINOIS

in diameter, which is said to cut a 7 inch brass or aluminum billet in five seconds.

Net weight of the unit is given as 9500 lbs. Floor space required is $64 \times 114^{1/4}$ inches, not including the feed trough.

Write the makers on your letterhead for further information, and please mention The BLUE BOOK.

Rejuvenating Old "Mikes"

Just a little while back, thousandths of an inch were considered close working limits. Higher speeds and consequent closer fit of working parts have made modern workers quite familiar with split-thousandth measurements. Such precision demands accurate measuring instruments. Micrometer anvils tend to wear concave in measuring rounded parts continually or sharp edges of parts eventually wear them convex. Many dollars' worth of parts have been scrapped through no fault of the operators, merely because micrometers were worn and inaccurate.

The Micro-Lapper is designed to overcome this by affording a depend-

able and easy method of keeping micrometers accurate. The hardened and



ground lapper block has small serrations on one surface providing minute cutting edges. A package of the proper lapping compound is included with each lapping block.

For further information, write the Machinists Tool Grinding Co., 3040 West Van Buren St., Chicago, Ill.

DON'T DIG IT OUT!

Use a Walton Tap Extractor

It is a simple matter to remove the broken tap,
--- the "Walton" Way --- quickly, easily --- without injury to
the threads --- without serious loss of time --- thus saving the
cost of labor and material already in the piece of work.

A Walton Tap Extractor often saves its cost over and over on the very first job. It's a practical, indispensable tool as proven by its extensive and continued use in many progressive industrial plants.

Stocked in 2, 3 and 4 flute styles.

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THE WALTON COMPANY, 95 Allyn St., Hartford, Conn.





MICRO-LAPPER

Keep your micrometer permanently accurate. Has your "mike" concave or convex anvils? You can "mike" within .0001 if your "mike" is lapped on a MICRO-LAPPER.

Hardened and ground. Furnished with I package of lapping compound. Micrometers lapped \$2.00. I-day service.

MACHINISTS TOOL GRINDING CO. 3040 W. Van Buren St., Chicago, Ill. Chicago. Ill.

Leitz Simplified Profile Projector

A new projector, suitable for the average tool and instrument shop, is being introduced by George Scherr Co., 128 Lafayette St., New York.

Intended for inspecting small mechanical parts such as gears, templets, gauges, watch parts, taps, screws, etc., the parts are placed on a compound table having a micrometer adjustment 1 x 1 in. in both directions.

Contour of the part is magnified 10 to 100 times, or up to 200 times in special cases, and projected on a drawing board, directly in front of the instrument. The operator compares the outlines with a drawing made to scale, or with one which has been traced on the paper previously from a master part known to be correct.

Deviations from standard can be measured accurately by means of the two micrometer screws attached to the cross table, or by means of gauge blocks to be inserted in case of greater

OHANSSON ACCESSORIES INCREASE THE USEFULNESS OF OHANSSON GAGE BLOCKS

There are other accessories and larger sets. Complete information in Catalog No. 12.

FORD MOTOR COMPANY Johansson Division Dearborn, Michigan





Your Johansson Blocks, used with an Adjustable Holder, a Scriber and Center Point, enable you to scribe an arc.



draw lines at a given distance above a plane.



A set of jaws with blocks will meusure diameter, Inside or outside. Jaws fit flat or convex surfaces.



These accessories can be purchased singly or in set No. 44, \$65 with case. distances, such as center distances between two holes.

The instrument is constructed in upright form to conserve space and may be placed on the work bench or a suit-



able cabinet. No dark room is required.

The aim of the designers was to

provide a simple method of placing the small parts directly on the glass top, eliminating the need for holding fixtures or vises. This is accomplished by the vertical arrangement of the beam of light.

In the case of cylindrical work, such as taps, thread, gauges, cutters, hobs or circular forming tools, the pieces are taken between centers and may then be checked, not only for form, lead and angle, but also for concentricity. The table may be swiveled 12 degrees in either direction, so that a sharp image is obtained on both flanks of screw threads up to 12 degrees helix angle.

The light source is a low voltage incandescent bulb (6 volts, 5 amperes) and may be connected directly to the lighting circuit of 110/120 volts by interpolating a rheostat supplied.

When not in use, the drawing board

When not in use, the drawing board is pushed back into the base, protecting the drawing and saving space.

Address the Scherr Co., for any further information desired, and please mention The BLUE BOOK.





NEW 7' SHAPER

All the precision and power of larger machines built down to scale. 4 speeds, 5 feeds, \$215, with guards.

10 Back Geared LATHE

Complete with countershaft, V-belts, change gears, automatic reversible power feeds, and many other features _ \$98.50 complete less motor. Timken bearings \$15.00.

Atlas Press Co.
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KALAMAZOO, MICHIGAN

INTRODUCING The KNU-SINE Universal



TOGGLE CLAMPS 3 Distinct Sizes

The newest and most feasible method of locating production parts in jigs, fixtures and dies. Toggle unit may be swung through 180 degrees, eliminating work in the Toolroom.

Send for descriptive bulletin.

KNU-VISE PRODUCTS CO. 6436 CASS AVENUE DETROIT. MICHIGAN

New Namco Milling Tool

The new circular type hollow milling cutter offered by National Acme Co., of Cleveland, O., is constructed and operates on the same principle as the circular threading chaser. Like the chaser, it may be quickly attached to National Acme's standard die heads, both revolving and stationary, for use in either automatic or hand operated machines.

The circular hollow mill and the threading chaser use blocks which are identical, making these interchangeable on the die head. It is possible to substitute the circular hollow mills for the threading chaser without removing the die head from the machine.



These new milling tools are built for precision or roughing work. They will perform end turning and end forming jobs, and enable turning from one to three diameters with one pass. A combination milling and threading job can be done on a multiple spindle machine, on which at least one die head is equipped with the new milling cutters and another with threading chasers.

NO BELT SLIPS WITH VACUUM CUP METAL PULLEYS



Shut Off Expense Caused by Slippage You Save Money on Every Installation

GUARANTEED to: Eliminate belt slippage and power loss because the belt is scaled to pulley at vacuum contacts . Increase life of belts and equipment . enable machines to take larger cuts and operate at maximum capacity . . wear indefinitely . . keep belts from flying off . . Sizes from $2^{\, \rm u}$ up to $72^{\, \rm s}$. . recommended for short center drives . . Try one at our risk on your worst drive.

30 Day Free Trial Offer.

VACUUM CUP METAL PULLEY CO., INC. 12536 Grand River Ave., Detroit, Mich



For Every Coolant

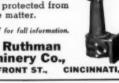
There's a GUSHER Coolant Pump of the proper type and the right size for every coolant need — and GUSHER Pumps stand up in the hardest kind of service.

They're self-priming have fewer wearing parts - never require repacking - no metal-tometal contacts - bearings are protected from abrasive matter.

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EVERY SHOP Operating an Emery Wheel needs a TRU-DRESS

The Perfect Emery Wheel Dresser



Forms special shaped wheels of any size. Trues any wheel into balance. Dresses out ridges and out-of-toundness with results equal to that of a diamond.

Smoothens out rough or uneven sides of emery wheels. A handy tool for truing clogged or dull wheels on flexible shaft grinders. An indipensable tool in any tool room or machine shop.

Durable - Simple - Easy to Handle - Lasting Send for illustrated circular.

Oliver MotorCraft Corp. 2532 S. Wabash Ave., Chicago, Illinois

The milling cutters are usable in practically every instance where the ordinary hollow mill is used. contour of the cutter face forms a radius for shoulder turning and similar

Higher speed of production, finer finish and coarser feeds are among the advantages claimed for the new tool.

The circular hollow mills open automatically at the completion of the cut. allowing the work to be withdrawn instantly without scoring.

The milling cutters are constructed of high speed steel, and are said to be made to precision limits equal to plug or ring gauges. They have bearing supports on six surfaces for strength and accuracy.

A double serrated bushing allows the milling cutters to be set ahead a small amount after each sharpening. Each cutter has 270 degrees of surface available for grinding, prolonging cutter Loosening one screw permits removing each cutter with its block. Grinding should be done to a specific reading on the National Acme micrometer gauge, to assure accuracy.

Close adjustment to work diameters is made inside the die head without disturbing the set-up. The adjusting mechanism moves all cutters simultaneously.

Cutters are being manufactured to fit the various die head sizes. Bulletin No. 3801 shows specific applications of this tool to a variety of work. Address the makers for your copy, preferably on your letterhead, and please mention The BLUE BOOK.



ONLY

BELT HOOKS have the blue Aligning Cards (patent applied for) that lock

hooks in position, pre-venthook lossfrom han-Every WIREGRIP dling and waste of short ends. Hook to the last one can be used.

ARMSTRONG - BRAY & CO. Loomis St., Chicago, U.S.A. 315 Loomis St.,

"The Belt Lacing People"

Johnson Portable Work Bench

O. Johnson Co., Brookfield, Ill., stress the usefulness of their portable work bench, with the thoroughly practical overhead hoist which makes handling of heavy die sets a one man job.

The bench is constructed on a strong and durable die truck chassis, with overhead construction for separating and assembling leader pin die sets.

The table is 30x40 inches and height from the floor is 34 inches. Overall height is 63 inches and the swing is 26 inches between table and overhead shaft. Safe load is given as 2400 lbs., and overhead safe load, 1600 lbs. The table is mounted on ball bearing heavy duty casters and rubber casters are optional.

The bench is of rigid all-steel construction, electrically welded, and substantially braced and reinforced throughout.

The adjustable sliding spools on the

overhead keyed shaft are easily adjusted to take care of any die up to



a maximum of 40 inches wide.

Address the makers on your letterhead for further information, and please mention The BLUE BOOK.

MORE OUTPUT H-P ON "SLOW SPEED" SHAFT

The prime objective of all Reducer building! Advances toward perfection are being made constantly. Abart is today building into its Reducers values undreamed of a while back. Get acquainted with Abart progressive methods. Use our resources in men, machinery and experience, like they

were your own, to get for you the one reducer best adapted to your needs. Cooperation will do it. Let us combine forces; no obligation. Complete catalog of line available free. Write.



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Speed Reducers & Sears

4832 WEST 16th ST CHICAGO ILLINOIS

Bardons & Oliver Cutting Off Machine

Light and heavy wall tubing, pipe and bar stock-up to a maximum diameter of 534 inches-can be cut off efficiently and rapidly in a new automatic cutting off machine developed by Bardons & Oliver, Inc., Cleveland, Ohio.

Two slides, one front and one rear, each carrying cutting-off tools, operate simultaneously, permitting the chip to be divided equally, thereby reducing the cutting time. Multiple cuts can be taken where pieces are not too long and two or more pieces can often be

cut off at one time.

The hydraulically - operated slides have rapid approach, feed and rapid return, two pumps being used for this purpose. The pump which feeds the slides is geared directly to the spindle, and feeds are obtained in thousandths of an inch per spindle revolution. Feed is adjusted by turning a graduated dial located directly on the pump, and feeds in increments of ten thousandths of an inch may be obtained. A constant rapid traverse is maintained by the second pump, driven by a separate constant speed motor.

Movements of the two slides are automatically controlled by a hydraulic valve, through easily adjusted trip dogs, when the machine is running automatically. The valve may also be operated manually for short run jobs of a few pieces, or when cutting off

crop ends of pipe.

The forged, high carbon steel spindle is mounted on tapered roller bearings. Two spindle speeds are afforded by a

sliding gear, controlled by a lever located on the front of the machine. The gear slides on a splined heat treated shaft which is mounted on tapered roller bearings.



A wide range of spindle speeds is obtained by means of change gears, conveniently located and easily acces-Gears and shafts are of heat treated alloy steel. Anti-friction bearings are used throughout. Gears and bearings run in a circulating oil bath provided by a pump and cascade system.



10 TYPES OF MEYLAN STOP WATCHES

A watch for every purpose

Ask for FREE folder No. 3H fully illustrating and describing some 40 types of stop watches. No salesmen will call.

A.R.& J.E. MEYLAN

"Specialists in timing instruments"

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50,000 R. P. M. Turbine Grinder

Experienced die makers will tell you why they like the Onarud MD-1 Grinder. Here is a 50,000 R.P.M. unit wish ¼ H. P. that actually makes the work fly. Handles with superbease. Won't heat up by overloading. Stays out of the repair shop because it is sturdily built. Can also be mounted and used as a stationary grinder. Write for bulletin.

Shown by Grinding Mchry. Company BOOTH 347 Detroit Show

ONSRUD MACHINE WORKS Inc., 3906 Palmer St., Chicago, III.





HORMEL-M GRINDER



An Inexpensive

ABRASIVE BAND GRINDER

"Built Like A Machine Tool"

The Hormel-M Grinder is sturdily buil, with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grase gun.

Write for illustrated felder on this and other styles and sizes.

WALLS SALES CORP.

96 Warren St., New York, N. Y.

The master collet is of a hinge type, air operated. It automatically compensates for slight variations in stock size. Greater variations are handled by manual adjustment. False jaws for different diameters are changed easily without removing collet from spindle.

There is said to be no limit to the length of stock that can be fed out by the patented roller bar feed. All that's necessary is to provide a stop bar of the proper length to suit the work. The roller bar feed is driven by a separate constant speed motor, maintaining a constant feeding rate regardless of spindle speed. The feed may be reversed electrically where it is necessary to back the stock out of the spindle. A disconnecting feature is built into the feed, by which the rollers may be spread apart when the collet is open, desirable when a bar or tube with a flared or ragged end is being started through the feed.

The stock stop is air operated and mounted on a rigid bar, anchored securely in the head casting. A fine adjustment of the stop along the bar is obtained through a rack and pinion, and the stop is clamped securely to the bar.

A coolant pump with built-in motor is mounted outside of the machine.

The constant speed main drive motor is carried on top of the head, and a flexible coupling connects it directly to the drive shaft.

Electrical controls are centralized within easy reach.

All movements of stock stop, collet, roller bar feed and tool slides are synchronized and controlled by an adjustable trip dog mounted on the front tool slide.

For solid bars, an accelerating feature is available, by means of which the spindle speed increases as the bar diameter is reduced, maintaining a uniform surface speed. A variable speed motor is used for this purpose.

Several types of chamfering and rounding attachments are available to suit various requirements.

Address the makers for further information, preferably on your business letterhead—and please mention The BLUE BOOK.

Detrex Three-Dip Degreaser

Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich., offer a three-dip, hand-operated degreaser.

As revealed by the cutaway illustration, the machine consists essentially of three chambers separated by wide dams which act as heat insulators. From left to right, these are designated as the boiling chamber, rinse chamber and vapor chamber.

This arrangement permits a straight line sequence of cleaning operations. The work, which is placed in large perforated baskets, can be lifted by hand or a hoist, depending on the weight.

The baskets are first lowered into the boiling solvent where the heavy contamination is removed. Continuous sweep of the boiling solvent over the work is said to give a scrubbing action that assists in removal of solid particles and caked-on materials.

Then the work is transferred to the second or rinse chamber. Tempera-

ture of the solvent here is lower than in the boiling section. Immersion in the cooler rinse lowers the temperature and flushes off the work. A final cleaning, reheating and drying are effected in the third or vapor chamber. The work emerges from this clean, warm and dry—ready for subsequent operations. At most, the cleaning cycle requires but a few minutes.



The water jacket and solvent collecting trough, shown in the illustration, completely encircle the machine. The vapors, which condense at the level of the water jacket, are collected in the trough and returned to the rinse chamber. This arrangement is depended upon for a continuous supply of clean solvent condensate for rinsing the work.

The machine is equipped with a vapor actuated, air-operated control system, consisting of thermostat tem-



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BLOWER-SUCTION CLEANER-SPRAYER

No type of cleaning compares with blowing or suction for speed—economy—thoroughness—safety or versatility. No portable blower compares with the Clements-Cadillac for efficiency and long life.

CLEMENTS MFG. CO.

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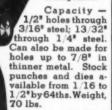


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Built for hard, tough work - die cannot lose align-PRICE WITH ONE PUNCH AND ONE ment with punch - all \$37.00 parts interchangeable. Immediate Shipment.



T. H. Lewthwaite Machine Co. (Est. 1890) 311 E. 47th St.

perature indicator and valve, used to regulate the heat input, control height of the vapor column, and insure maximum operating economy.

Constant solvent levels are maintained in the various chambers by a motor driven transfer pump which returns the overflow to the boiling chamber. This pump also serves to transfer solvent from any one chamber to any other when cleaning the machine or distilling the solvent, and may also be used for filling the machine.

The unit shown is arranged for steam heating of the solvent but models are available using gas or electric immersion heaters.

Overall dimensions are:- 7 ft. 1 in. long, 3 ft. 6 in, wide and 5 ft. 6 in. high. Solvent capacity is 123 gallons.

Address the makers on your letterhead for any further information, and please mention The BLUE BOOK.

This Catalog Should Interest You

Every tool room-in fact every shop that is at all interested in super speed vertical milling machines-should have a copy of the new Gorton catalog 1400-A.

Aside from the mass of interesting and useful information packed into the twenty 81/2x11 inch pages, there are lots of splendid illustrations. The facts are presented in an easy-to-read, orderly way.

As a catalog, it reflects credit on the Gorton organization. As a brief treatise on modern high speed vertical milling machine equipment and practice, the catalog will appeal to any one who appreciates fine tool equipment.

Address the George Gorton Machine Co., Racine, Wis., for your copy, using Quickmail Coupon No. 14.

Master Tapper in **New Quarters**

The Master Tapper Co., has moved from 272 Central Ave., Newark, N. J., to larger quarters at No. 2 Main St., Belleville, N. J., where they will have ample facilities to care for their growing business.

Knu-Sine Universal Toggle Clamps

Knu-Vise Products Co., 6432 Cass Ave., Detroit, Mich., announce a Knu-Sine universal action toggle clamp, available in three distinct sizes. The drawing gives a clear idea of the detail construction of these toggle clamps, and method of application. From this it is evident that the clamps afford a very convenient and practical method

SOME TYPICAL APPLICATIONS:

HORIZONTAL

ANGULAR

of locating production parts in jigs, fixtures and dies, in welding, sheet metal and die work. The toggle unit may be swung through 180 degrees, in many cases eliminating work in the tool room. Obviously, the toggle

clamp takes the place of "C" clamps, etc., for holding work pieces in location. All pivoted points rotate within hardened steel bushings, assuring long life of bearing points.

Referring to the drawing, Fig. A shows the device used for work in a vertical position. Fig. B shows an application where the work is below the clamp position. Figures C and D show two ways in which the base may be swung. Fig. E shows the amount of travel obtained with the toggle bar.

Address the makers for any further information desired, and please mention The BLUE BOOK.

A Correction

We published in the January BLUE BOOK, description of a new hub contour checker developed by the Michigan Tool Co., Detroit, Mich. The street address given should have been 7171 E. McNichols Road.





Machinists Tool Grinding Co.

3040 W. Van Buren St., CHICAGO, ILLINOIS

WHY DISCARD DULL POWER HACK SAW BLADES?

Your dull blades can be sharpened over and over again at the low cost of 21/1 ≠ per inch (12 blades or more).

New blades can have their efficiency increased 50% by sharpening before using, a time saving worth many times the nominal price spent for grinding.

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Assure Peak Production and Lower Maintenance. Rigid and Powerful. Bench and Floor Types, Motor or Belt Driven. There is a Linley machine for every riveting job.

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Cable, Welding Lincoln Electric Co., Cleveland, Ohio

Comet Tools, Inc., 39 Union Square, New York Scherr Co., George, 122 Lafayette St., N. York Cams, Alloy Steel Modern Collet & Machine Co., Ecorse, Mich.

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Chaser Grinders National Acme Co., Cleveland, Ohio Chasers, High Speed Steel Rickert-Shafer Co., Erie, Penna.

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Morrison Machine Products, Inc., Elmira, N. Y.

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Universal Eng. Corp., Frankenmuth, Mich.

Chucks, Air Hannifin Mfg. Co., 621 S. Kolmar Ave., Chgo. Tomkins-Johnson Co., Jackson, Mich.

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UNIVERSAL COLLET CHUCKS



Vertical Mill with Universal Collet Chuck holding die sinking cutter. (One of the many uses)



For Holding End Mills, Drills, Taps, Center Point, Keyway Cutters etc.

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We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

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1919 E. 61st St. Cleveland, Ohio



Why Not Modernize

your present equipment by using the RUSSELL BORING BAR? Bores holes from 9/16" to 12" dia. with axis of boring bar parallel to axis of the shank, in one compact tool, with micrometer adjustment.

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Pumps, Coolant Ruthman Machinery Co., Cincinnati, Ohio Tomkins-Johnson Co., Jackson, Mich.

Pumps, Lubricant Ruthman Machinery Co., Cincinnati, Ohio

Punch, Shear and Bender, Hand

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill. Buffalo Forge Co., Buffalo, N. Y.

Punches and Dies

Lewthwaite Mehe. Co., T. H., 311 E. 47th, N.Y.

Punches, Hand

Funches, Runa
Arnstrone, Blum Mfg. Co., 5741 Bloomingdale
Ave., Chicago, Ill.
Buffalo Forge Company, Buffalo, N. Y.
Lewthwaite Mche. Co., T. H., 311 E. 47th, N. Y.
Whitney Mctal Tool Co., Rockford, Ill.

Punches, Multiple

Beatty Machine & Mfg. Co., Hammond, Ind.

Punches, Power Beatty Machine & Mfg. Co., Hammond, Ind.

Pyrometers

Illinois Testing Laboratories, Inc., 150 West Austin Ave., Chicago, III.

Pyrometer Instrument Co., 102-105 Lafayette
St., New York City

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Pyrometers, Surface

Hinois Testing Laboratories, Inc., 150 West Austin Ave., Chicago, Ill. Pyrometer Instrument Co., 102-105 Lafayette St., New York City

Racks, Bar Stock Wm. S. Yohe Supply Co., Canton, Ohio

Renu Tool Company, Detroit, Mich.

Rivets, Tubular and Split

Chicago Rivet & Machine Co., 1855 S. 54th St., Cleero, P. O. Chicago, Ill.

Riveters. Automatic Feed Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Riveters, Multiple Spindle

Grant Mfg. & Machine Co., Bridgeport, Conn.

Riveters, Pneumatic

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Grob Brothers, Grafton, Wis.
Wells Mfg. Co., Three Rivers, Mich.

Scraping Machines, Hand & Pneumatic Anderson Bros. Mfg. Co., Rockford, Ill.

Screw Drivers, Electric Haskins Co., R. G., 4654 W. Fulton, Chicago Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.

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Modern Collet & Machine Co., Ecorse, Mich. Sutton Tool Company, Detroit, Mich.

Screw Machine Products National Acme Company, Cleveland, Ohio

Screw Machine Tools Banner Mfg. Co., 1873 Clybourn Ave., Chicago

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Screw Machines, Hand Warner & Swasey Company, Cleveland, Ohio

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Standard Pressed Steel Co., Jenkintown, Pa.
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Shaping Machines Osborne & Sexton Machinery Co., Columbus, O. Western Machine Tool Works, Holland, Mich.

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Robbins Engineering Co., Detroit, Mich.

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Lathe, No. 6 W. & S. turret.
Lathe, 8° Porter-Cable mig.
Miller, No. 18 Rockford.
Miller, No. 18 Rockford.
Miller, No. 19 Rockford.
Miller, Model C. I Becker hvy. vert.
Planer, 24x24x6° Gray.
Presses, Waterbury Farrel s. s. 7"
shaft, 30° between uprights (2).

FOR SALE BY

Scott-Bansbach Machinery Co.,

4607 West 20th St.,	Chicago, Ill.
Automatic acrew machines, B. & S., Nos. 90, 9, 2	G, and F
Brake, leaf type, Robinson, 10'x\u00e4 capacity, belt drive. Buffer, \u00e5 H. P. Hill Curtis, rite speed, tex rope drive. Broach, Hercules Power, 18 tou, motor drive	950 250 400
Drill, New Albany, h. s., motor drive, 110-60-1. Drill, Leland Gifford, h. s., b. b. sensitive, § capacity. Drill, Demoo h. s., b. b. § capacity. Drill, 210-1. Drill, 220-1. Drill, 220-1. Drill, 220-1. Drill, 230-1. Drill, 340-1. Drill,	110 175
Drill, Baker No. 310, heavy duty, No. 5 M. I., arrange Gasoline engine, 16 h. p. Gray, automatic start. Grinder, gear cutter, No. 23 Brown & Sharpe, 8° capac Gear cutter, B. & S. No. 3, 28° for spur gears. Gear hobber, No. 9 Pfauter, cap. 8° 16° 10 D.P. Gear hobber, No. 9 Pfauter, cap. 8° 16° 10 D.P. Gerinder, No. 1 Cincinnati, cutter and tool, belt drive Grinder, 8° 132° Norton plain motor drive with motor. Grinder, 8° 132° Norton plain motor drive with motor. Grinder, 8° 120° Fitchburg, takes 17° automatic feeds, formder, No. 1 LaSalle, hand and surface, belt drive. Grinder, No. 2 Morse, universal, capacity 12° 240°, bel Grinder, No. 2 Morse, universal, capacity 12° 240°, bel Grinder, Safety, surface, capacity 18° 12° 24°, magnetic 12° 24° 10° 10° 10° 10° 10° 10° 10° 10° 10° 10	a tor in d 590 125 ity 300 300 belt drive 590 , d 400 t drive 750 t drive 780 t drive 780 t drive 780 iii c chuck, b.d 780 high, belt dr 590
Hammer, No. 18B, High Speed, motor shell, \$\frac{\pi}{capacit}\$ capacit Hammer, No. 18B. High Speed motor shell, \$\frac{\pi}{capacit}\$ capacit Hammer, No. 4A. High Speed belt drive, \$\frac{\pi}{cap}\$ cap. With motor. Hammer, No. 5A. High Speed, motor shell, \$\frac{\pi}{capacity}\$ capacity. Hammer, Bradley, \$\frac{\pi}{cap}\$ lb. compact belt drive. \$\frac{\pi}{capacity}\$ capacity. Hammer, Bradley, \$\frac{\pi}{cap}\$ lb. compact belt drive. \$\frac{\pi}{capacity}\$ capacity. Hammer, Bradley, \$\frac{\pi}{capacity}\$ lb., upright strap, belt drive	ty 100 y 12" gap
Lathe, Stark bench, 7"x30"x\frac{1}{2}"cap., c. r., s. r., c. s. and t. Lathe, 13"x5" Monarch q. c., s. b. g., 4 jaw chuck taper z. Lathe, 13"x5" Williard, semi q. c., d. b. g Lathe, 13"x6 South Bend, standard change gears. Lathe, 14"x6 Worchester semi q. c., with 4 jaw chuck. Lathe, 14"x6 Worchester semi q. c., with 4 jaw chuck. Lathe, 15"x6 South Bend, standard change gears. Lathe, 15"x6 South Bend, standard change gears. Lathe, 15"x6 Schumacher & Boyer, quick change, s. b. Lathe, 15"x6 Schumacher & Boyer, quick change, s. b. Lathe, 18"x6 Monarch, q.c.g., d.b.g., with complete too Lathe, 18"x6 Davis d. b. g., q. c., heavy duty, Lathe, 18"x6 Davis d. b. g., q. c., heavy duty, Lathe, 18"x7 Davis d. b. g., q. c., heavy duty, Lathe, 20"x8 LeBlond, c. d. jaw chuck. Lathe, 21"x8 LeBlond, q. c., heavy duty, production ty Lathe, 20"x34 Fischburg, triple geared, pl. change, bloc Lathe, 18"x3 spinning, Grabo, 24" between centers Lathe, 22"x44" spinning gap, Pryibil, 49".78" between centers.	chuck 150 ttt,rebuilt 300 200 200 200 swing 350 250 350 5 1000m equip't 500 450

FOR SALE RY

General Machinery Corp. (John P. Tierney, Pres.) 140 Federal St., Boston

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Lathes, 18"x8" Cincinnati q. c. g.
Screw mach., No. 9 B & Swire feed.
Screw mach., No. 58 National Acme.
Planers, 29x20x4" & 30x30x8"
Press, Straight side, 12" between
columns, 4" crankshaft, 1" stroke.
Saws, 8x6 Racine high speed.
Threading machines.

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Midwest Equipment Co.

628 W. Lake St., Chicago EXCEPTIONAL VALUES
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Grinder, tool. No. 2 Van Norman, md
Grinder, die., S. van No. 2 Van Norman, md
Grinder, die., Van Norman, md
Lathe, sturret, No. 2 W&S frict. hd.,
wire feed, pwr, feed to turret.
Lathe, turret, No. 2 W&S frict. hd.,
wire feed, pwr, feed to turret.
Lathe, turret, W. & S. No. 6 frict. hd.,
Miller, B. & S., No. 3-B hvy. plain.
Pipe machine, Oster 2-2° capacity.
Planer, 36" x36" x15' o. s., 2 hds.
Shaper, Kelley 16".
Shaper, Smith & Mills, 16", b. g.
Shaper, Nin. No. 3144, 12" loga. m.d.
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Drills, Punch Presses, Air
Compressors, Belting and Motors.

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Shaper, 20" Gould & Eberhardt, high duty, motor driven.
All types metal working machinery. Send us your inquiries.

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Boring mill, 42" Bullare, 1 swive, and 1 turret head, m. d., p. r., t. Soring mill, 30" Bullard or VT L, threading attachment.
Drill, 34" Aurora, tap. attachment.
Drill, 18" All threading attachment.
Brunace, 28" Bl. Boas, b. d.
Hammer, 290 B. Beaddry, 20 wend.
Hammer, 290 B. Beaddry, 20 word.
Lathe, 18" "All three attachment attachment attachment, 29" Brunachment, 20" Brunachment

Polishing stand, 3 HP.US., 3/60/220. Press, arbor 30 ton Lourie, Hyd. Press, bench, No. 109-A. W-F., Wt.

275 lbs

Press, OBI No.21 Bliss, 1"&2"st. (3) Press 77 Bliss, T. R., 10" str. dbg. Press, D. C., No. 35-E Toledo, tie-rod; d. b. g., for m. d Press, No. 57-S Toledo, d. b. g., fctn.

Press, No.59 Toledo tie-rod, d.b.g., fctn. clutch. Press, P-3 Ferracute m. d. Press or shear, United 32" shaft,

m. d. (2)

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Pump, cent. 700 GPM., 4" disc. Punch, triple combination Pels 16.,

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combined, b. d. Punch. & sh. hand, No. 3B Beloit 5/16"x1".

Punch. & sh. hand, No. 3B Belott 5/16 '2". Punches, hand No. 6 Kidder. Riveters, Shuster, §" 32/16", belted. Kiveter, Shuster, §" 32/16", belted. Kiveter, No. 120 Grant, cap. §", m.d. Rolls, latch, 54' 329' P. S. & W., hand. Saw, band. 26" Clark "J M", gear box, AC motor.
Saw, No. 10 Racine 9x9", belted. Saw, cold, No. 1 Newton, §" belt. Saw, cold, No. 1 Newton, §" belt. Saw, cold, No. 1 Newton, §" belt. Saw, nilv., shaping, 8x8", m.d. Shaper, 14" Steptoe, sby.
Shaper, 14" Steptoe, sby.
Shaper, 24" Steptoe, sby.
Shaper, 24" Steptoe, sby.
Shaper, 24" G. & E motor 228-volt.d.c. Shear, angle, 8x618' Kling, m.d. Shear, rotary 322 Blins 14 g.s.
Shear, throatless 18-M Marshall-town, motor drive.

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Shear, squaring, 48"x14 ga. Excelsior b. d. Shear, bar 3" United, 24" blade, m.d. Shear, bar 3" United, 24" blade, m.d. Steam turbines, 100h. p. 900 rev (2). Testing mach. 100 Ton Olson, com. Tiering machines 600& 1000 lb. hand. ruck, Cowan Transveyor 500 lb. hand.

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Boring mill, No. 21 Lucas horiz Boring mill, 24" bar Clevelan Drill, D14 Colburn m. d., like new. Lathe, 29" x 12" Monarch, grd. hd. Lathe, 24" x 15" American grd. hd. Miller, No. 4 Cinc. vert. rap. trav. int feeds

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Miller, O. W. & Sn., b. b., 12" over.

Miller, O. B. & S. m.,

Miller, D. B. & S. m.,

Miller, Le B. No. 3 H, buy. d., univ.

Press, Hos Speed, 40 ton, W. F.

Press, No. 3 A Bliss tongle.

Press, No. 7, W. F. with 21" dial.

Press, Toledo, No. 54A spec., m. d.

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Band saw, 42" American, V belt, m.d. Bolt cutter, 2" Landis belt drive, Boring mid. 4" Bullard, rap, prod., threading attachment. Crane, 36' Gantry, 20 ton, hand oper.

Crane, 36° Gantry, 29 ton, hand oper, Drill, 6° Mueller radial, mtr. dr., Drill, D2 Colburn, 3° cap. Gear hobbers, 18° & 24° Goold & E. Grinder, No. 163 Rivett, internal hole cap. 1/48° to 2°. Grinders, No. 2 Diamond, surface, cap. 12° x48° motor drive. Hammer, 1100 lb. NBP, steam forg. Hammer, 2000 lb. Chambersburg double frame steam.

Hammer, 100 lb. NBP, steam forg. Hammer, 2000 lb. Chambersburg double frame steam. Lathes 16".18" L. & S., g. h., t. a. Lathes, 18"116" L. & S., g. h., t. a. Lathe, 38x24 New Haven, belt. Lathe, 36"x16" Putnam, triple geared

quick change.
Lathe, 38"x28' Johnson, belt drive.
Lathe, turret, No. 1 B&Shand screw
machine, belt drive, lot of equip.

machine, belt drive. lot of equip.
Lathe, turret, 3A Warner & Swasey
S. P. drive, cap 34".
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Shapers, 14,16,20 & 28" various makes
Shear, rotary, 38" throat Bethlehem,
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136 Liberty St., New York

Lathe, 17"x6" Le Blond, h. d. eng.
Lathe, Sloan & Chase bench type.
Layout plate, 77"x60"x6" high.
Magnetic separator, Dings.
Miller, Beker, duplex Lincoln type.
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10'x10 ga. m. d. Buffer & pol. 5 H. P. AC Marschke, 220/3/60. Drill, h d. No. 1 Baker, 24" cap. 22",

s. p. d.
Drill, rad. 2' Fosdick, t.a., b. d.
Drills, rad. (2) 2\frac{1}{2}' Cin.-B, t.a., m.d.
Drills, upright, 14" to 32", b. d. Drill, sensitive No. 1 Avey, b. b., 7"

o. h. b. d.
Drill, 4 sp. No. 2 Foote-Burt, cap.
4", m. d.
Furnaces, hardening, Tate Jones.
gas, 27"x20"x72".

gas, 27° x20° x22°. Gear hobber, No. 18 HN G & E.m.d. Gear millers, No. 1 Bilton, b.d., (2). Grinder, disc, 18° dbl.. Diamond,b.d. Grinder, plain, 12"x72" Landis, self-

cont. m. d. cont. m. d. Grinder, surf. 12" P & W vert. m.d. Ham., cush. hel. 100 b. Bradley, b.d. Hammer, st. forg. 5000-lb. N-B-P. Keyseaters, Nos. 00, Baker, Cap. 4",

m. d.

m. d. (200 h. s., m. d

n. s., m. d. Lathe, tur. 24" Steinle, 64" h. s., m. d. Miller, plain, No. 2 Cincinnati thle. 46"x10" b. d. Miller, plain, No. 2‡ Le Blond, thle.

Pittsburg, Pa.

52"x11", b. d.

Miller, plain No. 28 Ohio, table, 52"x11", b. d.

Miller, plain No. 4 LeBlond, table, 12"x72", b. d.

Miller, plain, No. 24 Brown & S.

table 17"x72", b. d.

Miller, univ. No. 1 Kempamith, tble.
19"x8", b. d.

Miller, univ. No. 2 Kempamith tbl.
10"x45" d. h. b. d.

Miller, univ. No. 28 Hendey-Norton

tbl. 10"x45" d. h. d.

Miller, univ. 10. 28 Hendey-Norton

tbl. 10"x45" b. d.

tbl. 10"x45" b. d. Miller, vertical, No. 4B Becker tbl. 36"x10" m. d. Miller, slab, 36"x36"x16' Ingersoll,

Miller, slab, 38 x38 x19 angerson, ad, rail, m. d.
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Planer, 60"x46"x14" N. B. P. 3 hds. bd.
Planer, openside, 96"x86"x20, D. &

Harvey, 3 heads, m. d. Press. tog., 400 ton Perkins, str. 14", belt drive

Press, o. b.i. No. 20 Bliss. 2" str.b.d. Profilers, Nos. E3& E4, Keller, a.c., m. d.

m. d. Punch & shear, type "C" Cleveland 13/16", 4" b. d. Rolls, bending, 8' Bertsch, 14 ga. in. t, hand.

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s. p. d.
Saw, hack, 13"x16" Peerless, m. d.
Shaper, 29" Queen City, b. g., b. d.
Shaper, 24" Smith & Mills, b.g., b. d.
Shaper, 24" G. & E., V-ram, b. d.
Shaper, 70" Cincinnati, b. g., b. d.
Shaper, 16" American, b. g., b. d.
Shaer, 18" Asia Si"x3/16" Niagara 15"
gap, m. d. 3"x3/16" Niagara 15"

gap. m. d. Shear, sq. 10'x14 ga. Nia., a. c. m.d. Shear, sq. 10'x3/16" Niagara, m. d. Shear, sq. 13'x‡" Hyde Park, 18"gap.

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Automatic, Cleveland 3" model A. Chucker, 3" Cleveland model M automatic.
Drills, ‡" cap. Demco 4 spindle
power feed, b. b. (\$)
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Schuchardt & Schutte.
Grinder, disc., No. 50 Gardner m. d
Tappers, (5) Webster & Perks
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Grinder, No. 6 Bryant internal.
Hammers, all sizes.
Lathe, Porter-Cable.
Lathe, Le Blond rapid production.
Miller, No. 33 Kempamith.
Miller, No. 32 Kempamith.
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Swager, 204 and 208 Etna. Tappers, 1, 2, 2X and 2BG Garvin

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WORLD'S LARGEST STOCK. POWER PRESSES No. 660 V. & O. double crank, 60" No. SR 203 Ferr dble. crk. 7" crk. 54" No. 5B Bliss double crank, 54". No. 407A Bliss double crank, 54". No. 407A Bliss double crk., toggle. No. 4 Bliss toggle. No 168 Toledo toggle. No. D201 Ferracute s. s. 14" stroke. No. 20 Zeh& Hah Percussion 400 ton, 600 ton No. 25K Bliss coining. 500 ton American Can coining. 400 t. No. EG 54 Ferracute coining. 250 ton Waterbury Farrel coining. 75 ton No. 3 Bliss coining.

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Bort cutter, Acme 2", belt drive.

Boring mill, 42" King. b. et d. b. d.

Boring mill, 42" King. b. d.

Bor. mill, hor. 5" bar Barrett. m. d.

Brake, 6" 10ga. Ohl press type.

Brake, 6" 10ga. Ohl press type.

Brake, 10-18 ga. b. ad. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 60-18 ga. b. and. 6, 9, 28, 29.

Chane, 74-10n Morgan, 220-d. c.

Crane, Crawler, gas., No. 2 No'wes.

Drill, radial, 6" Prentice, t. a., b. d.

Drill, radial, 5" American, s. p. d.

Drill, 1210 House Building. sear tester, bevel 18" Gle Sonason. Sear tester, bevel 18" Gle Sonason. Frinder, No. 58 Heald, b. d. frinder, roll, Farrel 28" 38" 3/49. Frinder, d. e. 3 He 22" 38" 3/49. Frinder, d. e. 2 He 22" 38" 3/49. Frinder, d. e. No. 8-20" 8-20 ammers, Nos. 2-B. 3-B. 4B. Nazel. Jammers, steam, forging & drop, Joist, 1 ton Shephard 220-V, D. C. ceyseater, No. 2 M & M, b. d. adles, 20 ton Whiting, top pour, athe, 11"5" Meyers, p. c. g., b.d. athe, 16"x6" Fosdick, d.b.g., a.g., athe, 18"x8" Fosdick, d.b.g., a.g., athe, 20x10 grd, hd, Schell, athe, 22"x12" R-L. q. c.g., d.b.g., athe, 42"x12" R-L. q. c.g., b.d., athe, 42"x15" P-rentice, grd, hd, athe, 42"x15" S. B. q. c.g., b.d., athe, top the service of the service of the athe, the spinning 32" b. d. athe, there is No. 4 W & S. b. d. athe, there is No. 4 W & S. grd, hd. athe, the control of the service of the athe, the service of the service of the athe, the service of the service of the athe, the service of athe, the service of athe, the service of athe ath

Miller, vert. No. 6 Becker, m. d.
Misters, Sprout-W., batch & Hqud.
Nibbler, No. 1 Gray 3/16, 34' thrt. bd
Pipe machine, 4' Oater, 229-3-60m.d.
Pipe machine, 2' Landis, b. d.
Pipe machine, 2' Landis, b. d.
Pipe machine, 2' Landis, b. d.
Pipemach, 2'' 8', 8', 12' Williams, md.
Planer, 42x62'x12' Cinc., 3 hdx, b.d.
Planer, 42x62'x12' Cinc., 3 hdx, b.d.
Planer, 0. S., 96x98'6x20' D. & H.
Planer, O. S., 96x98'6x20' D. & H.
Planer, O. S., 96x98'6x20' D. & H. Press, cam., No., 89N Bliss, dbl act, inc., Press, horn., No. 43 Toledo 14" str. Press, hyd. 100-ton Southwark. Press, hyd. 200-ton Oligear. Press, No., 58 Toledo, bed 20x19. Press, No., 58 Toledo, 8" stroke. Press, No., 74 Bliss, 8" stroke. Press, dbl. crank No., 5 Bliss, 2" str. Press, dbl., crank No. 5 Bliss, 2" str. Press, gap, No. 74 Bliss, consolidated Press, No. 6 Niagara, o. b. i. grd. Press, No. 7-A Niag., o. b. i. grd. Press, Screw, No. 87 Niagara. Press, 6-spindle, W-F. Punch, EF Cleveland, 36* firth., 14"-1" Punnps, Cent. 6", 4", 1", m. d. Riveters, air, hammer, spinning. Rolls, angle, Nia, 14:14x4" Rolls, Angle 4xx4 Buffalo, Rolling mill, cold 9"x18". Saws, friction, Nos. 2, 34 4 Ryerson. Rollis, Angle 434x Buffalo.
Rolling mill, cold 9".18".
Saws, friction, Nos. 2, 8 & Ryerson.
Saw, back, 48" Newton.
Saw, hack, Peerless, 5x8 220-3-60.
Saw, hack, Racine 6x6.
Saw, hack, Reine 6x6.
Saw, hack, Peerless, 13"x18". m. d.
Saw, shaping, Peerless 5x8, 220-3-60.
Scale, sheet bundling, 2500 lbs.
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Shear, 24x4" Bliss, b. d.
Shear, bate, 80"x2" Pels.
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Slitter, gang, 38" Ryaddock, b. d.
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Straight-ner, 43" Atma Stel 17 rol 18",
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Grinder, drill, Oliver, 13" cap.
Hammer, 80 lb. Bradley helve.
Hammer, 250 lb. Chamb. brd. drop. Hammer, 80 lb. Bradley helve. Hammer, 250 lb. Chamb. brd. drop. Hoists, 1 and 2 ton 229 v. d. c. Hoists, chain, 2 ton Vale & Towne. Hoists, chain, 2 ton Vale & Towne. Hoists, chain, 1 & 2 ton Y. & T. Lathe, 20° X12° Amer. 3 step cone. Lathe, 14.28° x6° F&S slid. hd. gap. Lathe, 18° x6° L&S pat. hd., m. d. Lathe, 38° x18° New Haven. pl. chk. Miller. No. 3-B Becker vertical. Miller. No. 4 Cinc. plain cone. Miller. No. 4 Cinc. plain cone. Miller. No. 3-B & plain. old style. Planer, 26° x20° x6° P. & W. i hd. Planer. 24° x20° x6° Cin., 2 hds. Presses, No. 18 Bliss obi. Presses, No. 58° Toledo s. s. grd. 35,000 bb. Press, No. 58° Toledo s. s. grd. 35,000 bb. Press, No. 7A Niagara. OBI 6° str. Press, No. 7A Niagara. OBI 6° str. Press, No. 78° Robe, m. d., grd., 72° stroke, 5600 bs. press. No. 38° Robe, m. d., grd., 72° between bousings. Press, Ferracute obl. crk., grd., 33° wide, 5° shaft, 4° stroke. Shapers, 16°, 26°, 24° b. g. crank. Slitter, gang, 36° x14 gs. Braddock.

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4—spindle No. 13D Moline,
8—spindle No. 64D Moline,
8—spindle Moline Hog,
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No. 5 Abrasive.
14* Model B Pratt & Whitney.
8*—14* Pratt & Whitney. 84" Diamond. 54* Liamond.
No. I Gardner.
No. 78 Wilmarth & Morman.
No. 2-No. 3 Cincinnati centerless.
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10x18-10x36 Norton BA. 12x18 Cincinnati Plunge Cut. 6x18-10x24-10x36-12x52-12x72

Landis. 10x36 Landis Camshaft. No. 132 Arter. 6x32 - 10x50 - 14x50 - 14x72 - 14x36

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MILLING MCHS. B. & S. No. 2B Hvy. Pl. SPD Van Norman No. 2 Duplex, Sub-Head, M. D. Hall Planetary Thread Mill, M. D. PLANERS & SHAPERS, Ohio 24x24x6', 1 head Cincinnati 48"x36"x8', 2 heads, M. D. Queen City 24", BG, Cone and C/S.

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LATHES 14x10' American Grd. Hd., M.D. 16x8' Monorch Geared Hd., M.D.

15x8' Monorch Geared Hd., M. D.
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24x 10' American—Q-C Cone.
24x 14' American—Q-C Cone.
30x 12' Boye & Emmes Q-C.
30x 14' American Triple Geared.
36x36' LeBlond Q-C.
31' Dreses S. P. Drive.
31' Dreses S. P. Drive.
4' American Motor Drive.
4' American Motor Drive.
4' Mueller S. P. Drive.
20' Kelley, Motor Dr., Gear Box.

20 & 24ª Cincinnati Cone Drive.

20 & 24* Cincinnati Cone Drive. 35x12* Gray Planer, 2 Heads. PRESSES No. 21 Bliss, O. B. Inc. No. 4 Rockford Back Genered Incl. No. 5 & 5A Toledo Inclinable. No. 18 & No. 19 Bliss Inclinable. Toledo No. 92C dbl crk bed 42x30.
Toledo No. 92C dbl crk bed 42x30.
Toledo No. 90C dbl crk bed 32x22,
No. 16 Blias Horn. Adj. Table.

GRINDERS

No. 2 Brown & Sharpe, Surface. No. 3 Wilmarth & Morman, Surf. 16x48 Diamond, Surface. No. 13 Brown & Sharpe, Univ. THE JONES MACHINE TOOL CO.

MILLING MACHINES
No. 2A B & S Universal, M. D.
No. 2B B & S Plain S. P. Drive.
No. 4LeBlond Plain, Cone Drive.
MI>CELLANEOUS
42* Gisholt Vert Boring Mill SPD.
61* Vertical Boring Mill. Spo.
61* Vertical Boring Mill. Spo.
72*xi 4 Ga. – Niagara Sq. Shear.
72*xi 4 Ga. – Niagara Sq. Shear.
Square Shear. — 32*x² 1.6.4.10* Gap.
Nibbler—Gray Yis² cap. 36* Thr.
Box & Pan Brake—74*35* M.D.
Spot Welders—10 to 100 K. W.
No. 4A & 5A—High S. Rivsters.
4 Spdl Barnes Camel Back g. drill.
No. 6 Foster Turret wire feed. No. 6 Foster Turret wire feed.

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Good Used Machinery

AIR COMPRESSORS: Curtis 9x9 dbl. cyl. vert.: 12x12 horiz.
BORING MILLS; Niles 36" c. d. Baush 44" m. d. N-B-P 54" s. p. d. Vert. with
2 heads; Barrett 5" bar c. d. horizontal; Bullard 51" Vertical 2 heads; Colburn 60" vertical. 2 heads.

CUT-OFF MACHINE, Davis 6" cap. (3).

DRILLS (RADIAL): Mueller 2½', Fosdick 2½', Prent. 3'; Carlton 4' all gear box dr.; Hammond 4' sensitive; Amer. 2½" M. D.

DRILLS (H. S. B. B.); H & W 2. 4. 5-sp.; Allen 2 & 6-sp.; Avey, Demco.

Lel-Giff. 1-sp.

DRILLS (MISC.): Baker No. 217 (2) & No. 314 Hvy. Duty; Hamilton 42" S.H.; Barnes 26" S.H. tap. attach.: Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.

GEAR CUTTERS; G & E 36", G & E 48", G & E 60" & B & S 26" s, p. d. automatic spur; Fellows 36" gear shaper. Cincinnati 36" gear cutter.

GRINDERS; P & W 12" vert. surf.; Cin. No. 1½ & B & S No. 12 univ. tool. B & S Nos. 11 & 16 plain, Heald Nos. 60 & 65 Int.; B & S No. 13 Univ. & Tool; Landis 10x30" Plain; B & S 10x48"; 4—Norton 6x32" plain, Heald No. 20 Rotary Surface (3). B & S No. 2 Univ.; Diamond No. 2 surface.

HONING MACH.; Hutto 2-spindle Vert. M. D.

KEYSEATERS; M & M No. 2 vert. Burr horiz.; Davis No. 1 vert.

LATHES; Reed-Prent. 16"x8' grd. hd.; LeBlond 18x8'; Lehmann 18"x9', Hendey 18"x8'; Amer. 22x8'; Whit. Blais. 22"x8'; Davis 22"x10'; L & S 20"x10'; S-B & E 20"x10' q. c. g.
MILLING MACHINES; Van Norman No. 2 duplex; Ohio No. 24; Kemp. No. 3;

B & S No. 3; Cleve. No. 1 s. p. d. univ.; B. & S. No. 2; Amer. No. 11/2; Cin. No. 3; B & S No. 3; Hendey No. 3; LeBlond No. 3; Mil. No. 3-B & Cinc. No. 3 s. p. d. pl.; Becker Model "B" & No. 6 vert.; Kemp. No. 33 s. p. d. Prod.; Ingersoll slab, m. d. 33", table 301/2"x16'.

PIPE MACHINES; Landis 12" A.C., m. d.

PLANERS; Gray 30"x30"x10' 2 heads; Flather 24"x24"x6'; N-B-P 48"x20' 4 hds.; Gray 28"x28"x6' 1-hd.

PUNCH PRESSES; Bliss No. 19 o. b. i.; Toledo No. 35 cl. back; Toledo No. 3 o.b.i.; Fer. No. PG-3 cl. back; L. & J. No. 3; Federal Nos. 1, 2, 3 and 4 o.b.i.; R. & K. No. 3 o.b.i.; Bliss No. 62 geared; Ferracute No. P-3; Bliss No. 65-N. 68-N dble. action.

SAWS (HACK); Racine 6x6" H. S. Atkins 8x8" H. S. Peerless 6x6" M. D. Univ.

Shaping.

SHAPERS; S & M, G & E, Ohio, Mil., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M., Q. City, Rock, 24"; Ohio 26"; Cin. 24" s. p. gr. box; Rock. 24" m. d. gr. box; Rhodes 3½" Vertical.

SCREW MACHINES: W & S No. 6 Hand; Nat. Acme. Nos. 515, 52, 55, & 56 4-sp.; Gridley 4-sp. 3/4" & 4-sp. 13/4" cap.

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THREAD MILLER: Moline No. 10: Lees-Bradner No. 4.

TURRET LATHE; Bullard 36" vertical, rapid production.

Above is only small part of our large stock on hand.

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12*x5¹ Clevel. Tool Room, Grd, Hd.
M. D. Pan Bed, Taper Att.
14*x6¹ Bradford Tool Room, Pan Bed
Taper Att.
16*x6¹ Bradford, C. C. G.
16*x6¹ LeBond, Q. C. G.
16*x6¹ LeBond, Q. C. G.
16*x6¹ LeBond, Q. C. G.
18*x6¹ Brades, G. G. C. G.
18*x6¹ Brades, S. Q. C. G.
24*x12¹, 24*x16¹ L. & S., Q. C. G.

1/4", 1/4" Hardinge Precision Bench. In the state of th

No. 2½ Rockford, Plain. No. 2 Reed-Prentice Vert. H. S. No. 13½ & 14 Garvin Plain. No. 2 Ohio, Plain. No. 2 LeBlond, Plain.

No. 2 Pratt & Whitney. Vertical. TURRET LATHES No. 1 Foster, Wire Feed, 34 Cap. No. 4 & No. 6 Warner & S. Bar Feed. PUNCH PRESSES, O. B. I. 25 O. B. I. Presses in stock.
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Niagara, Nos. 4, 4½.
Walsh No. 3.
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Drill, Sipp 4 spdl. h. s. b. brg.
Drill, Sipp 2 spdl. h. s. b. brg.
Drill, No. 2 Aveymatic, p. f.
Bor, mills 42º 6 60° Bullard Vert.
Grinder, Bath. Univ., comp. att.
Grinder, Bath. Univ., comp. att.
Grinder, 10224 Norton Cyl, arr.md.
Lathe, 28°x12' B. &t. E. q.c.g., t.a.
Lathe, 36°x12' Hamilton, i. c. g.
Lathe, 18°x8' Wolcott, q. c. g.

Lathe, 19 x 101 Sidney g. h. m. d., Latne, 19 x10 soney g. h. m. d., q. c. g. with taper att. Lathe, 18 x8 Amer. g. h. q. c. g. Mill, No. 2A Garvia univ. comp.e.p. Mill, No. 3 Kempamith plain, c. p, Mill, No. 4 Cinc. hi. pwr. pl. c. p. Mill, No. 2B Brown & S. plain. Press, 30 ton Lucas vert. forcing. Press, No. Toledo, o. b. i.

Press, No. 53 Tol. arch frame, b. g. Planer, 36"x36"x8' Amer., 2 heads. Screw Machine, No. 3 Foster hand. Screw Mcha., Nos. 1, 2 W. & S. hand. Saw, 6x6 Racine Power Hack. Saw, 10"x10" Napier metal cut, m.d. Shaper, 20⁸ Ohio crank, b. g. Shaper, 20⁸ Ohio crank, b. g. Shaper, 24⁸ Potter & Johaston univ. Shaper, 24⁹ Gould & E. high duty. Tappers, Nos. 2 & 2X Garvin vertical.

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168 American shaper, cone. 41/2 Morris Radial, gear box.

31/21 American radial, gear box. No. 1 Hoosier Heavy Duty Drill, M. D. 248x101 swings 271/21 Greaves-Klusman heavy duty Lathe, 20s 4 Jaw chuck cone.

21°x12' Le Blond Lathe, cone. 14"x6' Hendey Lathe, cone. 12*x72* Landie Plain Grinder.

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21/4" bar, N.B.P. knee, A. C., M. D.
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4" bar, Gisholt, Knee M/D.
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54" Bullard, P.R.T., M/D.
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96" Niles, P. R. T.

4', 5' & 6' American, Tri, Grd.
4', 5' & 6' American, Tri, Grd.
4' & 5' Amer. Triple Purpose.
3', 4' & 6' Muellers, gear box.
6' American, univ. & plain, (2),
3' American, sensitive, tapping.

3. American, sensitive, tapping. 2, 4 & 6 spindle Allens. 4 spindle Kokomo, 12½" overhang. 24" & 20" Barnes, Weigel, Rockford etc. 32" Cinci. Bickford, Tapping, M.D.

GRINDERS 8" Heald rotary Surface No. 200. No. 2 Fraser Univer. 10"x30". 10"x30". 10"x36" Landis Plain (3). 12" Heald rotary surface No. 22. 12"x32" No. 2 Landis Univ. 12"x36" Landis Plain. 16"x50" Norton Self Cont. 26"x120" Landis Self Cont. 26"x120" Landis Self Cont. 48" Badger face, Hyd. Feed. No. 2 Diamond 36"x12". No. 2 Diamond 36"x12".
84"x12" Diamond Surface.
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No. 55, 60 and 65 Heald Cylinder.
No. 70 Heald Internal.
53" Besley Vert. Spin. Disc.
14" P & W Surface M. D.
No. 2 B. & S. Surface M. D.
No. 13 B. & S. universal.
No. 103 Rivet Internal.

LATHES

16"x12' South Bend.
18"x8' Reed Prentice grd. hd.
18"x8' Lodge & Shipley, Cone.
18'36"x8' Fay Scott Gap.
22'24"x8' Lodge & Shipley, Cone.
24"x12' Putnam Q. C. G., Cone.
24"x12' LeBlond, Cone.
24"x12' American L. C. G.,
24"x19' American L. C. G.,
28"x17' Chard, Grd. Hd.,
30"x12' S & B Cone, T. A.
32"x22' Schumacher Boye.
36"x30' N.B.P. Grd. Hd., M. D.
60"x30' Putnam, Cone.
60"x30' Huthers Broduction

MILLERS, Production 4" Pratt & Whitney Spline. 8" & 12" Pratt & Whitney. 28" Cincinnati Semi Automatic. No. 7H Becker.

MILLERS, Vertical Model CS. Becker Continuous.
Model B Becker, feeds 36x14x15, spd.
No. 5B Becker, Cone.
No. 2 Knight.

No. 2 Knight.

MILLERS, Plain

No. 3 Cinci. Univ. Grd. Hd. M/D

No. 1½ Garvin Univ. Cone

No. 5Cinci. Grd. Hd., P.R.T.

No. 4G LeBlond, Geared Head.

No. 3B Heavy B & S Geared Head.

No. 3B Heavy B & S Geared Head.

No. 2B Heavy B & S. S.P.

No. 2B B & S. Grd. Hd. SPD.

No. 368"x18" VB.P., M.D., 4 hds.

2"x48"x18" Pound 4 hds.

2"x48"x19" Detrick & H. openside.

42"x36"x16" X12" & 24"x6" Cincinnati.

36"x36"x14" N.B.P. 2 hds. Rev. M.D.

36"x36"x36"x14" N.B.P. 2 hds. Rev. M.D.

36"x36"x30"x10" D. & H. Openside.

PRESSES

No. 74 Bliss Consolidated.

PRESSES No. 74 Bliss Consolidated.
No. 18 Bliss, O.B.I.
No. 12-7B Z & H dble, crank, 48",
No. 8½ Z. & H. Percussion.
400 ton N. B. P. Hor, Hyd. Carwheel,
ROLLS

10'x½" Pyramid, A. C., M. D. 17'x1¼" Niles A. C. m. d. SAWS

10x10 Napier Metal Band Saw. 6x6 Avey Milband. No. 2B Gorton Internal, 7½".

**Comparison of the comparison of the comparison

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Universal Horizontal Boring Mill 3* Bar.
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Leland 6 spindle H. S., B. B. Drill.

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Hydraulic Wheel Press 300 Ton, 48" between Rods.
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42"x10 ga. Magee Wiring Mchs., Pexto Rot. Sh., Nia. No. 16A.

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NEW 3 Phase Motors 1 to 20 H. P., 5 H. P. \$55.75

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11°x4' Shafiner Bench (new).
11°x5' Summit Floor Type (new).
10°x6' Sidney Lathe, floor type.
10°x5' Monarch, 800r type.
12°x5' LeBlond; 12x6' Monarch,
14°x6' Reed; 14°x6' LeBlond.
16°x8' Hamilton, quick change. 16'x8' South Bend. 16'x8' Monarch with taper attachment. 16'x5' Monarch, motor drive. 14'x8' Young.

14*x8' Monarch 3 step cone double back. 20*x10' Bradford; 24*x24' Prentice. 24 x 10 LeBlond extra heavy duty.

SHAPERS 25" Smith & Mills. 14" Niles traveling head. 16⁸ B. G. Queen City, (2). 20⁸ and 21⁸ Smith & Mills.

MILLING MACHINES No. 11/2 Valley City, plain. No. 4 LeBlond plain. No. 2 Brown & Sharpe, heavy. 24*x20*x8' Ingersoll.

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6° Newton Tool Room Slotter, power feed.
Baush Multiple Spindle Drill, 9 to 36 spindles.
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Production Type Rockwell Hardening Furnace.
Oil Tempering Furnace.
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No. 3 Becker Universal Mill, complete.
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14"26" Lodge & Shipley Grd, Hd. S.P.D. Taper. 16"28" Hendey Cone, Draw in Taper, rel. att. 18"214" Monarch Helleni Grd, Hd. M.D. 26"216' American 3 S.C.D. D.B.G. 26"214' Hendey Cone, Taper.

20"x10' American 3 S.C.D. D.B.G.
20"x14' Hendey Cone, Taper.
20"x25' American. H.D. cone, Taper.
21"x10' LeBlond Grd. Hd. S.P.D.
20"x8' American Cone H.D. Q.C.
24"x12' American Grd. Hd. S.P.D.
24"x12' Lodge & Shipley Cone, Q.C.
24"x12' Enadford Cone, Taper.
24"x12' Enadford Cone, Taper.
25"x14' Sharefran 3 S.C.D. R.G.
25"x14' Sharefran 3 S.C.D. P.B.G.
27"x12' American 3 S.C.D. P.B.G.
27"x12' American 3 S.C.D. R.G.
30"x12' American 3 S.C.D. R.G.
30"x12' American 3 S.C.D. R.G.
36"x12' L & S.E. Grd. Hd. Taper S.P.D.
36"x24' L & S.S. Grd. Hd. M.D.
27"x20' American Grd. Hd. M.D.

Planers

Planers
24"x24"x6" Gray.
24"x24"x8" Gray.
26"x26"x8" Cleveland Openside.
36"x30"x10" Gray.
36" Cincinnati Openside Planer Shaper, M.D.

Shopers Shapers 16", 20" 24", Sould & Eberhard Cone Drive, 16", 20" 24", 28", 32", Gould & Eberhard S.P.D. 16", 20", 24", Gould & Eberhard M.D. 20" Columbia H.D. Cone. 24" Smith & Mills S.P.D.

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21° Cincinnati Bickford tapping attachment.
24° Cincinnati Bickford Tapping attachment.
24° Cincinnati Bickford Tapping attachment.
24° Cincinnati Bickford Tapping attachment.
26° Foodick Plain S.P.D. 6° American Trip. Grd.
27° American sensitive Cone.
28° And 6° American Trip. Purp. Enclosed Hd.

Gear Cutters No. 1 and 3 Adams Farwell Hobbers.
No. 6, 624 Fellows Gear Shapers.
No. 12 Barber Colman Hobbers.
6, 11" Gleason Bevel Gear Generators.
No. 6-00", 3-25", 4-39", 4-48" B & S Automatic.
No. 5-00" Newark Gear Cutter.
6" Bilgram Gear Generators.

6" Bilgram Gear Generators.

Milling Mochines

No. 1 Knight Miller & Driller.

2" Cincinnati Automatic Plain Like New.

No. 33 Kempamith Plain Production M.D.

No. 2 Hendey Univ. Div. Hd. Cone.

No. 2 Kempamith Univ. Div. Hd. Cone.

No. 2 Cleveland Plain, S.P.D.

No. 2 Kenpamith Univ. Div. Hd.

No. 2 Cleveland Plain, S.P.D.

No. 3 Cincinnati H.P. Univ. Div. Hd.

No. 3 Kenpamith Univ. Cone.

No. 4 Cincinnati Plain H.P. Cone. Div. Hd.

No. 4 Cincinnati H.P. Rect. O.A. S.P.D. Vert.

Grinders

Grinders

No. 1 LeBlond No. 13 B. & S. Univ. Tool & Cut. No. 3 Ohio Universal Tool & Cutter. No. 3 Ohio Universal Tool & Cutter. No. 51 Oliver Drill Grinder M.D. No. 51 Oliver Drill Grinder M.D. No. 2 Brown & Sharpe Surface, Mg. Chuck.

60" Blanchard M.D. Like new. No. 5-48" Abrasive Surface M.D. 100 Hrs. use. 14" Pratt & Whitney b. b. Surface, Mag. Chuck. No. 78 Wilmarth & Morman Surf. Grdr., Belt. 3" Pratt & Whitney Surface. 30"x120" Landis Self Contained B1T, Drive. 6x18", 10"x36", 12"x36" Landis Self Contained. 12"x36" Bath Univ. No. 50, 55, 60, 65 Heald Internal.

Hammers No. 2½ Mossberg & Granville Drop Hammer. 50 lbs. Little Glant. No. 4B and 6N Nazel Air Hammers.

Compressor Ingersoll Rand, with Tank, Slip Ring Motor, Comp.

Tappers

Tappers
No. 1, No. 2, No. 2X, No. 2BG Garvin Autom.
Vertical Mills & Boring Mills
24 Bullard Rapid Production S.P.D.
42 Colburn Rapid Trav.
60 Cincinnati Rap. Prod., Rap. Trav. Arr. M.D.
No. 2 B & S Vertical Mill Cone.
No. 2 B & S Vertical Miller.

Pipe & Bolt Machines 1", 2" Acme Class A Bolt Cone. 2" Acme M.D. 2", 2½", 3" Landis Bolt Cone. 2½" Landis with Lead Screw. 2" Landis Pipe. Acme Class A Bolt Cone.

Scrws Scrws No. 5 Marvel Automatic, M.D. No. 5 Marvel Automatic, M.D. 7 Atkins 8x8. No. 2 Klemm Metal Band Saw.

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No. 184 Chicago Steel Bending Brake Arr. M.D. 8'x10 gauge. 10'x10 Gauge Chicago Steel Bending Brake.

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No. 1½B, 4A, 2A HD, High Speed Rivetters.
No. 80, 80B Grant Rotary Spinners. Keyseaters

No. 00, No. 2 Baker, No. 3 Baker. Presses

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Drills, Mult. No. 11, No. 12, No. 40 Natco 8 spind Foote Burt Mult. Spindle 32 spindles. No. 40 Natco 8 spindles.

Turret Lathes No. 7 Foster Univ. Grd. Hd. 4¼" Hollow spdl. No. 4 & 6 Warner & Swasey Plain, Bar Feed. No. 4 & fisholt Plain. 24" Libby Grd. Hd. 7" hollow spindle.

2A W. & S., Timb 14"x19" Timken, Serial over 350,000.

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HITCHCOCK'S MACHINE TOOL BLUE BOOK

Advertisers Index

A-1 Screw Machine Products 132 Eastern Machinery Co. 147 Emerman, Louis É.	
	155
Aaron Machinery Co. 147 Emerman, Louis É. Abart Gear & Machine Co. 126 Eisler Engineering Co., Inc.	106
Acme Industrial Co. 103 Errington Mechanical Laboratory	40
Air-Way Pump & Equipment Co. 6 Essex Brass Corporation	113
American Hollow Boring Co. 136 Easley Machinery Co., E. L.	174
American Rotary Tools Co. 85 Ex-Cell-O Corporation	7
American 1001 works	
Ames Co., B. C. Failor-Strafer Machinery Co.	151
Anderson Bros. Mfz. Co. 108 Falk Mill Supply Co., Inc.	166
Armglo Company 78 Fameo Machine Co.	86
Armstrong-Blum Mfg. Co. Inside Front Cover Federal Press Co.	55
Armstrong-Bray & Co. 125 Federal Products Corporation Armstrong Bros. Tool Co. 46 Fitchburg Grinding Machine Corporation	****
Armstrong Bros. Tool Co. 46 Fitchburg Grinding Machine Corporation Atlas Equipment Co. 162 Flynn Manufacturing Co.	exes.
Atlas Press Co. 123 Ford Motor Co.	122
Atlas Press Co. Ayer Mfg. Co., F. H. 123 Ford Motor Co. Fulflo Specialties Co., Inc.	
Baldor Electric Co. 98 Galland-Henning Mfg. Co. Banner Mfg. Co. 177 Gallmeyer & Livingston Co. 188 Gallmeyer & Livingston Co. 189 Gallmeyer & Livingston Co	29
Banner Mfg. Co. 77 Gallmeyer & Livingston Co. 168 General Blower Co. 6. General Blower Co. 77 General Blower Co. 78 General Blower C	3
barad 1001 at Supply Co., the	147
Baumbach Mfg, Co., E. A. 137 General Machinery Corp.	149
Beatty Machine & Mfg. Co.	96
Beal & Co. 166 Ginera manimery Corp. Beatty Machine & Mfg. Co. 11 Goldman, Harvey H. Belyea Company 147 Goldman, Harvey H. Bennett-Rafus Machine Toal Corp. 165 Go-	168
Rennett-Rafkin Machine Tool Corn 165	128
Berkeley Engineering Co. Greene, Tweed & Co.	73
Bernstein & Co., Geo. M	103
Grob Brothers	
	99
motwithin protects 100	
Bradley Machinery Co. 151 Hackett Co., J. Lee	170
Bradley Machinery Co. 151 Hackett Co., J. Lee Breuer Electric Co. 99 Brewster Company, Wm. 76 Bridgeport Pattern & Model Works 76 Hanna Engineering Works	18-109
Bridgenort Pattern & Model Works	
Breuer Electric Co. 99 Brewster Company, Wm. 76 Bridgeport Pattern & Model Works Hannifan Manufacturing Co. Hanna Engineering Works Hannifin Manufacturing Co. 148 Brown & Sharpe Mfg. Co. 25 Brown & Sharpe Co. 148 Brownell Machinery Co. 148 Hartford Special Machinery Co.	4
Brown & Sharpe Mfg. Co. 25 Hartford Special Machinery Co.	102
	139
Brownell Machinery Co. 148 Harvey Mfg. Co. Buffalo Forge Co. 10 Haskins Co., R. G. Burke Machiner Tool Co. 159 Hassal, John, Incorporated Burns Machinery Co., F. W. 169 High Speed Hammer Co. Bur & Son, J. T. 100 High Speed Machinery Co.	16-21
Burke Machine Tool Co. Hassal, John, Incorporated	70
Burr & Son, J. T. Hill-Clarke Machinery Co.	158
Busch Co., J. C. Hobart Brothers	92
Burr & Son, J. T. 100 Busch Co., J. C. 107 Busch Co. J. C. 107 Canedy-Otto Mfg. Co. 35 Howart Machinery Co. 107 Howart Ma	147
Carison Mig. Co., C. H.	125
Carroll & Son. Wm. 114 Challenge Machinery Co. Illinois Testing Laboratories, Inc.	117
	0
Indianapolis Machinery & Samply Co.	173
Chicago Electric Co. 173 Indianapolis Machinery & Sapply Co. Inland Machinery Co. Inland Machinery Co.	164
Chicago Gear Works 115 Interior Steel Equipment Co. Interior Steel Equipment Co. Interior Steel Adapting Co.	69
Chicago Electric Co. 173 Chicago Gear Works 115 Chicago Rivet & Machine Co. 135 Chicago Tool & Engineering Co. 135 Chicago Wheel & Mig. Co. 90, 91 Interstate Machinery Co. Interstate Machinery Co. Interstate Machinery Co. International Machinery Co.	161
Chicago Wheel & Mfg. Co. 90, 91 International Machinery Co.	148
Cincinnati Machinery & Supply Co. 167 Iroquou Machinery Co.	164
	105
Clements Mfg. Co. 129 Janctte Mfg. Co. 36 Colonial Bushings Co. 36 Johnson & Sons Machinery Co., Wm. C., 171 Johnson Company, O.	177
Colonial Bushings Co. 36 Janette Mg. Co. Sons Machinery Co., Wm. C. Columbia Machinery Co. 171 Johnson & Sons Machinery Co., Wm. C. 20 Johnson Company, O. 20 Jo	118
Comet Tools Inc	162
Commercial Centerless Grinding Co. 102 Jones Machine Tool Co., Cincinnati	149
Continental Machine Specialties Inc. 97	
Continental Machine Specialties Inc. 97	124
Commercial Centerless Grinding Co. 97 Continental Machine Specialties, Inc. 12 Conway Clutch Co. 42 Knu-Vise Products Co. 106 Craley Mr. Co. 106	124
Commercial Centerless Grinding Co. 97 Continental Machine Specialties, Inc. 12 Conway Clutch Co. 42 Knu-Vise Products Co. 106 Craley Mr. Co. 106	124
Commercial Centerless Grinding Co. 97 Continental Machine Specialties, Inc. 12 Conway Clutch Co. 42 Knu-Vise Products Co. 106 Craley Mr. Co. 106	124
Commercial Centerless Grinding Co. 97 Continental Machine Specialties, Inc. 12 Conway Clutch Co. 42 Craley Mg, Co. 106 Cullman Wheel Co. Back Cover Dalitz, Harry 171 Dalitz, Harry 171 Dalitz, Harry 281 Dalitz, Go. 28	124 89 151
Commercial Centerless Grinding Co. 97 Continental Machine Specialties, Inc. 12 Conway Clutch Co. 12 Craley Mg. Co. 106 Cullman Wheel Co. Back Cover Dalitz, Harry 171 Dalrae Tools Co. 28 Dalrae Tools Co. 28 Doam Machinery Co. T. H. Dalrae Tools Co. 28 Doam Machinery Co. T. H. Dalrae Tools Co. 28 Doam Machinery Corporation	124 89 151 130 148
Commercial Centerless Grinding Co. 97 Continental Machine Specialties, Inc. 12 Conway Clutch Co. 12 Craley Mg. Co. 106 Cullman Wheel Co. Back Cover Dalitz, Harry 171 Dalrae Tools Co. 28 Dalrae Tools Co. 28 Doam Machinery Co. T. H. Dalrae Tools Co. 28 Doam Machinery Co. T. H. Dalrae Tools Co. 28 Doam Machinery Corporation	124 89 151 130 148
Commercial Centerless Grinding Co. 97	124 89 151 130 148 132 37
Commercial Centerless Grinding Co. 97	124 89 151 130 148 132 37
Commercial Centerless Grinding Co. 97	124 89 151 130 148 132 37 118 130
Commercial Centerless Grinding Co. 97	124 89 151 130 148 132 37 118 130
Commercial Centerless Grinding Co. 97	124 89 151 130 148 132 37 118 130 119 163

HITCHCOCK'S MACHINE TOOL BLUE BOOK

Advertisers Index

Machinery Dealers Incorporated	172	Russell Boring Bar Co.	134
Machinery Dealers Incorporated	131	Russell Machine Co	17U
Madison-Kipp Corporation		Ruthman Machinery Co.	125
Mall Tool Company	43	*	
Mail Tool Company Marr-Galbreath Machinery Co.	150	Schoner Machine Co	62
Manshalltown Mfr. Co.	93	Schauer Machine Co.	180
Marshalltown Mfg. Co. Martin Tool & Die Werks, J. E.	64	Scherr Co., George Schmidt, Geo. T., Inc. Scott-Banshach Machinery Co. Scully-Jones & Co. Scall Machinery Co.	LOU
Martin 1001 & Die works, J. E.	100	Schmidt, Geo. T., Inc.	IUI
Master Lamp Co. Master Tool & Die Maxwell Company, F. A. Meylan, A. R. & J. E.	100	Scott-Bansbach Machinery Co.	149
Master Tool & Die	110	Scully-Jones & Co. 26-1	170
Maxwell Company, F. A.	87	Segal Machinery Co.	153
Meylan, A. R. & J. E.	127	Segal Machinery Co. Seneca Falls Machine Co.	101
Michigan Chrome Co.	137	C	151
Michigan Tool Co	13	Service Co.	131
Michigan Tool Co. Midwest Equipment Co.	149	Service Co. Severance Tool & Mfg, Co. Sheldon Machine Co.	
Mildwest Equipment Co.	154	Sheldon Machine Co.	119
Miles Machinery Co.	13.4	Siewek Tool Co.	
Miller & Crowningshield		Simmons Machine Tool Corporation	157
	114	Siewek Tool Co. Simmons Machine Tool Corporation Simonds Saw & Steel Co. Front Co	ver
Modern Machine Corporation	120	Skilsaw, Inc.	14
Modern Machine Tool Co.	63	Skilsaw, Inc. South Bend Lathe Works	22
Morey Machinery Co., Inc. Morrison Machine Products, Inc.	175	Stackbin Corporation	60
Morrison Machine Products, Inc.	5	Stackbin Corporation Standard Electrical Tool Co.	400
Morse Tool Co.	48	Standard Electrical Fool Co.	38
Marie I W	***	Standard Gage Co., Inc.	36
Moyer, J. N.		Standard Machinery Co.	148
		Standard Machinery Co. Standard Pressed Steel Co.	44
National Aeme Co.	27	Stanley Works Steege Machinery Co.	79
National Machine Tool Co.	64	Steege Machinery Co.	
Never Rust Company Nicholson & Co., W. H. Nielsen, Incorporated 104-	80		15
Nieholeen & Co. W. H.	83	Strippit Corporation	100
Micholson & Co., w. H.	110	Strippit Corporation	175
Nielsen, Incorporated 104-	112	Strong, Cartiste & Hammond Co.	1 40
Norgren Co., C. A.		Sturdimatic Tool Co.	109
Norgren Co., Č. A. Norton-Broadway Machinery Co.	172	Strippit Corporation Striopit Corporation Strong, Carlisle & Hammond Co. Sturdimatic Tool Co. Sundstrand Machine Tool Co.	31
Nutmeg State Machinery Corporation	150	Sun Machinery Co.	169
, 1		Super Tool Co.	
OlD-1 MMC-	150	Super Tool Co. Surplus Stock & Machinery Co., Inc.	150
O'Brien Machinery Co. Odin Universal Corporation	56	Sutton Tool Co.	53
Odin Universal Corporation			-
Oliver Instrument Co.	61		
Oliver Machinery Co.		Tannewitz Works	131
Oliver Motorcraft Co.	125	Taylor Machine Co.	134
Onsrud Machine Works	127	Toledo Machinery Exchange	
Oliver Machinery Co. Oliver Motorcraft Co. Onsrad Machine Works Osborne & Sexton Machinery Co.	166	Tannewitz Works Taylor Machine Co. Toledo Machinery Exchange Tomkins-Johnson Co.	62
Ott Machinery Sales, Inc.	162	Triplex Screw Co.	139

Passman Brothers, Inc.		United Machinery & Supply Co. Universal Engineering Corporation 72- Universal High Speed Tool Co. Used and Rebuilt Machinery 147-	148
Pier Equipment Co.	67	Universal Engineering Corporation 72-	133
Plunket Machine Co.	74	Universal High Speed Tool Co.	
Porter Machine Co.	136	Used and Rebuilt Machinery 147-1	178
Pratt & Whitney	24	Cook and stephen machinery	
Precision Tool Co.	75		
Prints Electric Co.	60	Vacuum Cup Metal Pulley Co.	124
Prints Electric Co. Procunier Safety Chuck Co.	34	Verson Allsteel Press Co.	33
Procumer Safety Chuck Co.	85	Victor Machinery Co.	169
Progressive Tool & Cutter Co.		Verson Allsteel Press Co. Victor Machinery Co. Victor Machinery Exchange	160
	105	Vine R A	166
	151	Vonneent Moulder Composition	07
Putnam Tool Co.	23	Vine, R. A. Vonnegut Moulder Corporation	24
Putnam Tool Co. Pyrometer Instrument Co.	129		
*		Wade Instrument Co.	116
Queen City Electric Co.	148	Wain Machinery Sales, Chas. E.	151
*		Walls Sales Corporation	128
			121
R & I. Tools	65	Walton Co.	
R & L Tools	65	Walton Co.	0.4
R & L Tools Racine Tool & Machine Co.	65 111	Wardwell Manufacturing Co.	94
R & L Tools Racine Tool & Machine Co. Reich Mfg. Co., J. R.	65 111	Walton Co. Wardwell Manufacturing Co. Wells Mfg. Corp.	94
R & L Tools Racine Tool & Machine Co. Reich Mfg. Co., J. R. Reisinger Manufacturing Co.	65	Walton Co. Wardwell Manufacturing Co. Wells Mfg. Corp.	149
Reliance machinery Sales Co.	134	Wardwell Manufacturing Co. Wells Mfg. Corp. Wertman Machinery Co.	32
Remeo Products Corporation	56	Wardwell Manufacturing Co. Wells Mfg. Corp. Wertman Machinery Co.	32
Remeo Products Corporation	56	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remeo Products Corporation	56	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remeo Products Corporation Renu Tool Co. Rickert Shafer Co.	56 41	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remee Products Corporation Remu Tool Co. Rickert Shafer Co.	56 41 111 95	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remee Products Corporation Remu Tool Co. Rickert Shafer Co.	56 41 111 95 78	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remee Products Corporation Remu Tool Co. Rickert Shafer Co.	56 41 111 95 78 2	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remoe Products Corporation Remo Products Corporation Remo Tool Co. Rickert Shafer Co. Ridge Tool Co. Rigid Tool Holder Co. Rivett Lathe & Grinder, Inc.	56 41 111 95 78 2 84	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remace Machinery Saies Co. Remo Products Corporation Renu Tool Co. Rickert Shafer Co. Rigid Tool Holder Co. Rigid Tool Holder Co. Rivett Lathe & Grinder, Inc. Rockford Drilling Machine Co. Rosers & Co., Samuel C.	56 41 111 95 78 2 84 64	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	32 152
Remace Machinery Saies Co. Remo Products Corporation Renu Tool Co. Rickert Shafer Co. Rigid Tool Holder Co. Rigid Tool Holder Co. Rivett Lathe & Grinder, Inc. Rockford Drilling Machine Co. Rosers & Co., Samuel C.	56 41 111 95 78 2 84 64 20	Walton Co. Wardwell Manufacturing Co. Wells Mig. Corp. Wells Mig. Corp. West Mig. Corp. Western Machinery Co. Wiesern Machinery Co. White Machinery Co., A. D. Wiener Machinery Co., Inc. Wiener Machinery Co., Inc. Wigglesworth Machinery Co. With Machinery Co., Inc. Wittek Manufacturing Co. Wolnick Machinery Sales Wyzenbeck & Staff, Inc.	149 32 152 174 17 147 150 45 148
Remace Machinery Saies Co. Remo Products Corporation Renu Tool Co. Rickert Shafer Co. Rigid Tool Holder Co. Rigid Tool Holder Co. Rivett Lathe & Grinder, Inc. Rockford Drilling Machine Co. Rosers & Co., Samuel C.	56 41 111 95 78 2 84 64	Walton Co. Wardwell Manufacturing Co. Wells Mig. Corp. Wells Mig. Corp. West Mig. Corp. Western Machinery Co. Wiesern Machinery Co. White Machinery Co., A. D. Wiener Machinery Co., Inc. Wiener Machinery Co., Inc. Wigglesworth Machinery Co. With Machinery Co., Inc. Wittek Manufacturing Co. Wolnick Machinery Sales Wyzenbeck & Staff, Inc.	149 32 152 174 17 147 150 45 148
Remace Machinery Saies Co. Remo Products Corporation Remo Tool Co. Rickert Shafer Co. Ridge Tool Co. Rijed Tool Holder Co. Rijed Tool Holder Co. Rivett Lathe & Grinder, Inc. Rockford Drilling Machine Co. Rogers & Co., Samuel C. Rogers Mg. Co., Dayton	56 41 111 95 78 2 84 64 20	Walton Co. Werls Mfg. Corp. Wells Mfg. Corp. Wertman Machinery Co. Western Machine Tool Works West Penn Machinery Co.	149 32 152 174 17 147 150 45 148



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